I500-6619-2024
October 23, 2024

EW-C6619

PROJECT MANUAL

FOR

KITTITAS DEPOT HISTORIC PRESERVATION

AT

PALOUSE TO CASCADES STATE PARK TRAIL

IN

KITTITAS COUNTY

BID OPENING: 1:00 P.M., TUESDAY, JANUARY 14, 2025

ELECTRONIC BID RESPONSES ONLY: Bid responses will only be accepted electronically via Email/Email Attachment to BidBox@parks.wa.gov. (PDF scan encouraged).

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

WASHINGTON STATE PARKS & RECREATION COMMISSION
1111 ISRAEL ROAD SW
TUMWATER, WA 98501-6512
POST OFFICE BOX 42650
OLYMPIA, WASHINGTON 98504-2650

PROJECT MANUAL

FOR

PALOUSE TO CASCADES STATE PARK TRAIL
KITTITAS DEPOT HISTORIC PRESERVATION

AT

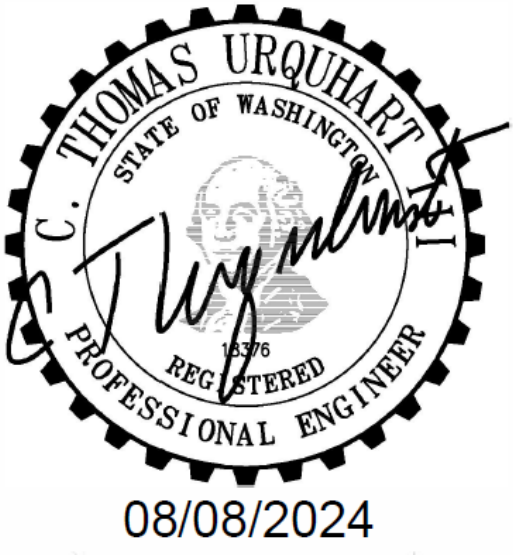
PALOUSE TO CASCADES STATE PARK

IN

KITTITAS COUNTY

6934 REGISTERED ARCHITECT LOWELL CATE STATE OF WASHINGTON **PROJECT ARCHITECT**	ANDREW DEAN McEACHERN STATE OF WASHINGTON 38722 STRUCTURAL PROFESSIONAL ENGINEER 08/08/2024 **PROJECT STRUCTURAL ENGINEER**

	
PROJECT CIVIL ENGINEER	**PROJECT MECHANICAL ENGINEER**

	
PROJECT ELECTRICAL ENGINEER	**PROJECT ENGINEER**

Approved for Construction _____

Heather Saunders, Director of Parks Development

WASHINGTON STATE PARKS AND RECREATION COMMISSION
1111 ISRAEL ROAD SW
TUMWATER, WASHINGTON 9501-6512
P.O. BOX 42650
OLYMPIA, WASHINGTON 98504-2650

Diana Dupuis,
Director

STATE OF WASHINGTON
WASHINGTON STATE PARKS AND RECREATION COMMISSION
1111 Israel Road SW • PO Box 42650 • Olympia, WA 98504-2650 • (360) 902-8500
Internet Address: http://www.parks.wa.gov

November 15, 2024

Re: Letter of Advertisement – Palouse to Cascades State Park Trail – Kittitas Depot Historic Preservation – EW-C6619

To whom it may concern:

Please publish the following legal advertisement under your "Advertisement for Bid" section for two (2) consecutive days beginning on **Tuesday, November 19, 2024**, *or at your earliest possible convenience*. An Affidavit of Publication will be required by this office. A voucher form is enclosed for your convenience in billing.

ADVERTISEMENT FOR BID

Sealed bids will be received for the following project:

PROJECT NUMBER:	EW-C6619
PROJECT TITTLE:	Kittitas Depot Historic Preservation
PROJECT DESCRIPTION:	This project rehabilitates the 1909 Kittitas Depot with foundation work, roof replacement, window and door repairs, new ADA restrooms, updated MEP systems, insulation, painting, and site improvements.
PROJECT LOCATION:	The project is located at the Palouse to Cascades State Park Trail, Railroad Avenue and Main Street in the City of Kittitas. The project site has not been assigned an address.
ESTIMATED BID RANGE:	$1,185,000.00 - $1,350,000.00
PROCUREMENT COORDINATOR	Manuel Iglesias
BID OPENING TIME:	**1:00 PM on Tuesday, January 14, 2025**
PREBID WALKTHROUGH:	**11:00 AM on Wednesday, December 18, 2024**. Meet at the project site

PLANS, SPECIFICATIONS, ADDENDA, AND PLAN HOLDERS LIST: Are available on-line through Builders Exchange of Washington, Inc. at http://www.bxwa.com. Click on: "bxwa.com"; "Posted Projects"; "Public Works", "Washington State Parks & Recreation", and "**01/14/2025**". (Note: Bidders are encouraged to "Register as a Bidder", in order to receive automatic email notification of future addenda and to be placed on the "Bidders List". This service is provided free of charge to Prime Bidders, Subcontractors, and Vendors bidding this project.)

Alternatively, bidders have the option to access Bid Documents, including Specifications and Drawings, at www.parks.wa.gov/contracts by clicking on the Construction Projects link for reference purposes. However, the official channel for notifications is through the Builders Exchange of Washington.

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

TECHNICAL QUESTIONS regarding this project shall be directed to: Alex McMurry, Project Representative at (360) 902-0930 or alex.mcmurry@parks.wa.gov.

BID RESULTS will be published on the State Parks Builders Exchange of Washington webroom and in the Construction Projects section at www.parks.wa.gov/contracts after the bid opening. This practice ensures that those involved and interested can readily view bid outcomes, enhancing transparency and efficiency in the bidding process.

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

BIDDER RESPONSIBILITY will be evaluated for this project. In determining bidder responsibility, the Owner shall consider an overall accounting of the criteria set forth in Division 00 – Instructions To Bidders. Please direct questions regarding this subject to the office of the Project Engineer.

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

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

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

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

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

Businesses at https://www.dva.wa.gov/veterans-their-families/veteran-ownedbusinesses/vob-search.

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

Manuel Iglesias, Procurement Coordinator

STATE OF WASHINGTON
PARKS AND RECREATION COMMISSION
CONTRACTS AND GRANTS

PALOUSE TO CASCADES STATE PARK TRAIL
KITTITAS DEPOT HISTORIC PRESERVATION

DIVISION 3 - CONCRETE

DIVISION 4 - MASONRY

DIVISION 5 - METALS

DIVISION 6 - WOOD AND PLASTIC

DIVISION 7 – THERMAL AND MOISTURE PROTECTION

DIVISION 8 – OPENINGS

DIVISION 9 – FINISHES

DIVISION 10 – SPECIALTIES

DIVISION 12 – FURNISHINGS AND ACCESSORIES

DIVISION 20 GENERAL MECHANICAL

DIVISION 22 PLUMBING

DIVISION 23 HEATING, VENTILATING, AND AIR CONDITIONING (HVAC)

Division 26 ELECTRICAL

END OF SECTION

INVITATION TO BID

1.1 SPECIAL NOTICE(S)

A. All work for this project must be completed by June 30, 2025, and billing received by the Washington State Parks and Recreation Commission by 5:00 P.M., July 12, 2025.

1.2 DESCRIPTION OF WORK

A. This project will rehabilitate the existing 1909 Kittitas Depot. The work includes foundation improvements, window and door repair and replacement, roof replacement, selective demolition, installation of two new ADA compliant restrooms, new mechanical, electrical, and plumbing systems within the building, insulation installation, painting, site improvements (including paving and concrete flatwork), and other items.

1.3 LOCATION OF PROJECT

A. The project is located at Railroad Avenue and Main Street in the City of Kittitas. The project site has not been assigned an address.

1.4 TECHNICAL QUESTIONS

A. Direct project questions to Alex McMurry, Project Representative at (360) 902-0930 or alex.mcmurry@parks.wa.gov.

1.5 PRE-BID PROJECT SITE TOUR

DATE:	Wednesday, December 18, 2024
TIME:	11:00 AM
LOCATION:	Project Site

1.6 BID OPENING

A. Bid responses will only be accepted electronically via email/email attachment BidBox@parks.wa.gov. See Section 7.1 of the Instructions to Bidders for expanded details. Subject line shall read EW-C6619 [YOUR COMPANY NAME]. Bids are due at 1:00 p.m., Tuesday, January 14, 2025.

B. Bid result notification is made by e-mail within two (2) days of the bids due date. Bid results can be obtained on the State Parks webpage at www.parks.wa.gov/contracts or through Builders Exchange of Washington at www.bxwa.com

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

1.7 COVID 19

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

1.8 FOR INFORMATION ON:

A. Bidder Responsibility: Bidder Responsibility will be evaluated for this project. In determining bidder responsibility, the Owner shall consider an overall accounting of the criteria set forth in Division 00 – Instructions To Bidders. Please direct questions regarding this subject to the office of the Project Engineer.

B. Reciprocal Preference: See Instructions to Bidders 2.1 Reciprocal Preference for Resident Contractors.

C. Apprenticeship Requirements: For projects estimated at or over $1,000,000, Apprenticeship Participation, Mandatory 15 percent apprentice labor, see Instructions to Bidders 4.1B Apprenticeship Participation.

D. Subcontractor Listings: When the base bid combined with any alternates totals $1,000,000 or more, the Bidder must list the Subcontractors they intend to use for structural steel, rebar installation, heating, ventilation, and air conditioning (HVAC), plumbing, and electrical work on the Subcontractor Utilization List form for this project, see Instructions to Bidders 4.1A Subcontractor Listing.

E. MWBE goals: See Instructions To Bidders 3.1 Minority And Women's Business Enterprise (MWBE) Utilization. For Veteran-Owned and Small Business utilization, see Instruction to Bidders 3.2.

F. Modification of Bid: See Instructions to Bidders 8.1 Modification of Bid.

G. Withdrawal of Bid: See Instructions to Bidders 9.1 Withdrawal of Bid.

H. Bid Security: See Instructions to Bidders 11.1 Bid Bond. No particular bid bond form is required.

I. Bid Tabulation and Bid Record: See Instructions to Bidders 12.1B for Bid Tabulation, Bid Record, and Announcement of Apparent Low Bid.

J. Records Request: All submitted bids are subject to public records request once the lowest bidder has been determined and officially announced. See Instructions to Bidders 12.1D Records Request.

1.9 ACCESSIBILITY

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

END OF SECTION

WASHINGTON STATE PARK AND RECREATION COMMISSION
PUBLIC WORKS PROJECT

1.1 BIDDER DEFINED

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

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

2.1 RECIPROCAL PREFERENCE FOR RESIDENT CONTRACTORS

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

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

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

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

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

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

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

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

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

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

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

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

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

A. VOLUNTARY MWBE GOALS

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

   MBE 10% WBE 6%

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

B. REPORTING REQUIREMENTS

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

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

C. RECORD KEEPING

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

D. SUGGESTED EFFORTS TO INCREASE PARTICIPATION BY MWBEs

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

2. Additional Voluntary Efforts. Bidders are encouraged to:

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

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

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

   (d) Reduce bonding requirements where practicable.

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

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

E. NON-DISCRIMINATION

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

F. SANCTIONS

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

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

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

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

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

   WDVA 5% Small Business 5%

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

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

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

A. SUBCONTRACTOR LISTING

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

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

B. APPRENTICESHIP PARTICIPATION

In projects estimated to cost One Million Dollars or more, be aware that the following requirements will be part of the resulting contract.

In accordance with RCW 39.04.320 (Apprenticeship Training Programs), for all public works estimated by the WSPRC Project Engineer to cost **one million dollars or more,** the state of Washington requires no less than **15% of the labor hours be performed by apprentices.** A contractor or subcontractor may not be required to exceed the 15% requirement. The bid advertisement and Bid Proposal Form shall establish a minimum required percentage of apprentice labor hours compared to the total labor hours.

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

2. **Penalties** - The Contractor who fails to meet the utilization requirement and fails to demonstrate a Good Faith Effort, as outlined below, is subject to penalties described in

the Apprentice Utilization Requirements section of the contract Bid Form. Contractor will receive an invoice payable to the Owner within 30 days.

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

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

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

   b) The Plan is not submitted for approval.

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

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

C. APPRENTICESHIP - GOOD FAITH EFFORT (GFE)

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

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

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

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

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

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

      3. Contractors may receive a GFE credit for graduated Apprentice hours through the end of the calendar year for all projects worked on as long as the Apprentice remains continuously employed with the same Contractor they were working for when they graduated. If an Apprentice graduates during employment on a project of significant duration, they may be counted towards a GFE credit for up to one year after their graduation or until the end of the project (whichever

comes first). Determination of whether or not Contract requirements were met in good faith will be made by subtracting the hours from the journeyman total reported hours for the project and adding them to the apprentice hour total. If the new utilization percentage meets the Contract requirement, the Contractor will be reported as meeting the requirement in good faith,

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

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

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

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

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

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

   Letters, emails, phone logs including names dates and outcomes, posters, photos, payrolls, time cards, schedules, copies or references to other contract specifications or documents.

Additional Resource Information

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

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

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

5.1 EXAMINATION OF THE WORK SITE AND BIDDING DOCUMENTS

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

The bidder also acknowledges that it has satisfied itself as to character, quality, and quantity of surface and subsurface materials or obstacles to be encountered insofar as this information is reasonably ascertainable from an inspection of the site, including exploratory work done by the Owner, as well as from the drawings and specifications made a part of this contract. Any

failure of the Bidder to take the actions described and acknowledged in this paragraph will not relieve the Bidder from responsibility for estimating properly the difficulty and cost of successfully performing the work.

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

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

D. Interpretations and Clarifications

1) Every request for interpretation or clarification should be submitted to the project representative as listed in the Invitation to Bid. If a Bidder does not have on-line capability, then submit in writing, addressed to the project representative at the address as listed in the Invitation to Bid. To be given consideration the request must be received seven (7) working days prior to the date fixed for the opening of the bids.

2) The Agency's responses, if there are any, which do not change the Scope of Work described in the contract documents may be mailed, delivered, faxed, or by other electronic means, to all planholders of record, at the respective address furnished for such purposes, prior to the date fixed for the receipt of bids. Such letters of clarification shall not be considered part of the contract documents and therefore need not be acknowledged by the Bidders as part of the Bid Form. The Agency will determine at its sole discretion whether or not any clarification or interpretation changes the Scope of Work and should be included in the Contract Documents.

3) Clarifications, interpretations, or supplemental instructions which do change the Scope of Work and or schedule described in the contract documents, will be issued only in the form of written ADDENDA.

4) Oral interpretations or clarifications will be without legal effect.

E. Substitutions

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

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

6.1 BID PROPOSAL

A. The Bidder shall submit its bid on the forms included with these instructions. All blank spaces in the Bid Proposal Form must be properly filled in. If the bid is made by a partnership or co-partnership, it must be so stated and it must be signed in the firm's name, followed by the written signature of the signing partner. If the bid is made by a corporation, it must be signed in the name of the corporation, followed by the written signature of the officer signing, and the printed or typewritten designation of their office within the corporation. The full and complete address of the Bidder must be typed or printed on the bid in the spaces provided. The bid must be a scan of the original bid, complete with an original signature (pen to paper).

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

C. Each Bidder shall bid upon the work exactly as specified and as provided in the Bid Proposal Form. The Bidder shall bid upon all alternates if alternates are indicated on the Bid Proposal Form. When bidding on alternates for which there is no charge, the Bidder shall write the words "no charge" in the space provided on the Bid Proposal Form.

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

7.1 SUBMISSION OF BID

A. Bid responses will only be accepted electronically via email/email attachment BidBox@parks.wa.gov.

B. Marking of The Bid Response (Email Subject Line):

Subject line should include the bid's identification number, "Bid" and Company name.

- Example email subject line: NW-C9999 Bid John Smith Construction LLC
- Example email subject line: EW-C9999 Bid Sunshine Construction Corp.

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

D. Signature (what is acceptable):

The purpose of a signature is to ensure a manifestation of asset by the signer and to legally bind the signer to the documents submitted.

In 2020 Washington State enacted law allowing for alternatives to hardcopy original wet-ink signatures. While the Bidder cannot force any process upon the Agency, the Agency can mandate and accept alternatives to an original wet-ink signature.

The Agency will accept a picture of an original wet-ink signature, such as a PDF scan. .JPG, TIFF-Group 4 (or similar technology). These three (3) technologies are known to work. The Bidder's use of other technology is at the Bidder's risk and peril. Bids or bid formats that the Agency cannot open, and view shall be deemed non-responsive.

For clarity: Print out the competition document, review it, include any other required document(s) (such as the Bid Bond if required), complete where necessary, sign where indicated with a pen onto the paper, when you believe your bid response is ready to be submitted to the Agency, scan it as a PDF file, check the PDF file to make sure all pages are legible, then attach the file to your business email and send it to BidBox@parks.wa.gov.

It is the Agency's expectation that the Bidder's bid response email will contain a PDF attachment with all of the required documents scanned as a PDF, including any required signatures.

7.2 BID CLOCK:

After the bid opening (due date deadline), Agency staff will review the bids. The email's date and timestamp that is visible on the email, from the Agency's perspective, shall serve as the bid clock and it is this information that will be used to determine if the bid was timely.

CAUTION: Submit your bid response early as a safeguard against any technological slow-down or delays and/or malfunctions. Bids received after the deadline for any reason, no matter the cause, regardless of responsibility, will be rejected. When and whatever time the email comes in, the Agency will reference the email's timestamp to determine responsiveness.

You are welcome to follow up with an email to contracts@parks.wa.gov and ask confirmation of receipt and the Agency can send a reply to the sender of the bid response. However, our ability to respond is not instantaneous, not guaranteed, and works best if there's at least three (3) business days of time to respond.

8.1 MODIFICATION OF BID

A. Modifying And Supplementing Prior To Bid Opening:

Modifying: Modifying refers to a bid that has already been submitted to the Agency. Modifying means altering information already contained in the Bidder's bid response that has already been submitted to the Agency.

Supplementing: Supplementing refers to a bid that has already been submitted to the Agency. Supplementing means adding to the bid response for materials, documents, or information not already in the Bidder's bid response.

HOW: Bidder may modify or supplement its bid prior to the bid due date by sending a replacement bid by email to: BidBox@parks.wa.gov. In the body of the email clearly explain that this bid response is replacing an earlier one. Follow the example subject line.

Example email subject line: SW-C9999 Replacement Bid ACME Construction Inc.

Do not send in a piece of a bid response asking the Agency to link it up with the earlier bid response. Send in a full and complete replacement.

9.1 WITHDRAWAL OF BID

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

B. Procedure for Withdrawing a Bid Before Bid Due Date: Bidder may withdraw its bid prior to the bid due date by sending an email to: BidBox@parks.wa.gov. In the body of the email clearly explains that the earlier bid submission is being withdrawn. Follow the example subject line. Example email subject line: SW-C9999 Withdraw Bid ACME Construction Inc.

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

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

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

10.1 REJECTION OF BID

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

11.1 BID BOND

A. When the total bid amount is $35,000 or less, a bid bond is not required. When the sum of the base bid plus all additive bid alternates is $35,000.00 or less, bid security is not required.

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

C. Acceptable forms of bid guarantee are: A bid bond. A copy of the bid bond must be included along with your bid response to the Agency. See also, Section 7.1 SUBMISSION OF BIDS – SECTION A.

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

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

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

12.1 BID EVALUATION AND AWARD OF CONTRACT

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

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

The Agency does not guarantee when the Bid results will be released to the public. The bid results are usually released within three business days of the bid opening and often the same day. Bid results can be obtained by accessing the Washington State Parks webpage at www.parks.wa.gov/contracts (see "Construction Projects- Public works bid results"). The Bid Tabulation results may also be released through Builders Exchange of Washington at www.bxwa.com. But, Bidders are cautioned that the Washington State Parks website is the official release point for the Bid Tabulation for this competition.

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

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

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

Within two (2) business days following the day of the release of the Bid Tabulation/Bid Record or the Announcement of the Apparent Low bid, the Bidder may file a Protest (Protest procedures are outlined in Section 13.1).

C. REJECTION LETTER & PROTEST: No matter the phase of the evaluation, if the Agency determines that the bid is not responsive or the Bidder is not responsible, the Agency will reject the bid/bidder, and send the bidder a Rejection Letter explaining why the bid/bidder was rejected. Within two (2) business days following the day of the release of the Rejection Letter, the Bidder may file a Protest, provided it meets one of the three (3) protest grounds (Protest procedures are outlined in Section 13.1). The Rejection Letter will be sent by email/email attachment to the email address provided by the Bidder in the Bidder's bid response.

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

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

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

RESPONSIBLE - A Bidder must meet the following mandatory responsibility criteria under RCW 39.04.350 (1) to be considered a responsible Bidder and qualified to be awarded a public works project. The Bidder must:

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

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

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

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

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

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

7. Within the three-year period immediately preceding the bid solicitation, not have been determined by a final a binding citation and notice of assessment issued by the department

of labor and industries or through a civil judgment entered by a court of limited or general jurisdiction to have willfully violated, as defined in RCW 49.48.082, any provision of Chapters 49.46, 49.48, or 49.52 RCW. By signing the Bid Proposal Form, the bidder verifies under penalty of perjury, pursuant to RCW 9A.72.085. that the bidder is in compliance with this subsection

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

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

    b. At least seven (7) days prior to the bid submittal deadline, a potential Bidder may request that the Agency modify the supplemental responsibility criteria. The Agency will evaluate the information submitted by the potential Bidder and respond before the bid submittal deadline. If the evaluation results in a change of the criteria, the Agency will issue an ADDENDA to the bidding documents identifying the new criteria.

    c. Upon the Agency's request, the apparent low Bidder must supply the requested responsibility information within two (2) business days of request by the Agency. Withholding information or failure to submit all the information requested within the time provided may render the bid non-responsive and the bid/Bidder may be rejected by Rejection Letter.

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

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

1. It is received at the proper time and place.

2. It meets the stated requirements of the Bid Proposal Form.

3. It meets the requirements as stated in section 6.1.A of the Instructions To Bidders.

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

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

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

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

13.1 PROTEST PROCEDURES

A. GENERAL:

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

Only a Bidder may file a protest regarding this competition.

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

B. FORM AND CONTENT:

All protests must:

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

C. CONTENT LIMITATIONS:

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

The Agency will reject protests that:

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

D. SUBMISSION OF PROTEST:

- All protests must be submitted within two (2) business days following the day of the release of the Bid Tabulation/Announcement of the Apparent Low bid or after the formal Rejection Letter is sent. For purposes of timing the day of the release of the Bid Tabulation or the day of the Rejection Letter is sent to the Bidder shall not count.

- Bidders must send all protests to: contracts@parks.wa.gov. See also Subject Line.

- SUBJECT LINE: Must include the bid's identification number, and "PROTEST" in the subject line. Failure by the Bidder to include this information in the subject line may result in Bidder's protest not being timely recognized.

E. GROUNDS WHICH MAY BE PROTESTED:

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

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

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

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

F. MANAGER ASSIGNMENT AND REVIEW:

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

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

G. PROTEST DETERMINATION AND FINDINGS AND DISSEMINATION:

The Manager's protest determination may:

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

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

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

H. AGENCY DECISION IS FINAL:

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

I. STRICT COMPLIANCE

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

J. REPRESENTATION

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

K. COMPUTATION OF TIME

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

L. ACKNOWLEDGEMENT

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

14.1 EXECUTION OF CONTRACT

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

15.1 SUBCONTRACTOR PARTICIPATION MONITORING AND REPORTING

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

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

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

END OF INSTRUCTIONS TO BIDDERS

/ / / / /

AVAILABLE INFORMATION

PALOUSE TO CASCADES STATE PARK TRAIL
KITTITAS DEPOT HISTORIC PRESERVATION

Reports, Existing Condition Information, Existing Hazardous Material Information, etc.

- Asbestos Containing Materials and Lead Based Paint Inspection (21 pages)
- Geotechnical Report (32 pages)
- Structural Calculations (40 pages)
- Stormwater Technical Information Report (35 pages)
- Construction Stormwater Pollution Prevention Plan (80 pages)

Revised Geotechnical Engineering Report

Kittitas Rail Depot Restoration
116 Main Street
Kittitas, WA 98934
Parcel No. 727736

September 11, 2024
Revised October 2, 2024

prepared for:

Helix Design Group
Attention: Jeff Ryan
6021 12th Street East
Tacoma, WA 98424

prepared by:

Migizi Group, Inc.
PO Box 44840
Tacoma, WA 98448
(253) 537-9400

MGI Project Z0739

TABLE OF CONTENTS

Page No.

List of Tables

List of Figures

APPENDIX A

APPENDIX B

MIGIZI GROUP, INC.

PO Box 44840
Tacoma, Washington 98448

PHONE (253) 537-9400
FAX (253) 537-9401

September 11, 2024
Revised October 2, 2024

Helix Design Group
6021 12th St E
Milton, WA 98424

Attention: Jeff Ryan

Subject: **Revised Geotechnical Engineering Report**
Kittitas Rail Depot Restoration
116 Main Street, Unit B
Kittitas, WA 98934
Parcel No. 727736

MGI Project Z0739

Dear Mr. Ryan:

Migizi Group, Inc. (MGI) is pleased to submit this revised geotechnical engineering report describing the results of our geotechnical evaluation for the proposed restoration and improvements at the existing historical Kittitas Train Depot located in Kittitas, WA.

This report has been prepared for the exclusive use of Helix Design Group and their consultants for specific application to this project, in accordance with generally accepted geotechnical engineering practice.

1.0 SITE AND PROJECT DESCRIPTION

The project site consists of a single elongated tax parcel located along the southern side of the intersection of Railroad Avenue and Main Street in Kittitas, WA, as shown on the enclosed Topographic and Location Map (Figure 1). The parcel includes both Wilson Park and the "Cascade to Palouse" state park trail, with two small existing structures of the historic railway depot building and a detached materials and tool shed.

The parcel is approximately 9.8 acres in size and elongated east to west, being roughly ±145 feet north to south and ±2,780 feet east to west. Topographically, the site is relatively flat, varying by roughly 1 to 3 feet across the whole parcel. Current site access is located at the eastern edge of the park, off N Lincoln St, turning onto a gravel drive.

The proposed improvements of the property include restoration and modernization of the existing rail depot building, and installation of new asphalt pavement for parking and new concrete sidewalk and curbline along the south side of the property. Current plans call for onsite-generated stormwater to be infiltrated onsite in two swales along the southern property line.

2.0 EXPLORATORY METHODS

We explored surface and subsurface conditions at the project site on July 24, 2024. Our exploration and evaluation program comprised the following elements:

- Surface reconnaissance of the site,
- Two test pit explorations (designated TP-1 thru TP-2) advanced across the proposed asphalt improvement area on July 24, 2024,
- One Smal Scale Pilot Infiltration Test along the southern property line, approximately 30 feet west of TP-1, and
- One Organic Content (%) and Cation Exchange Capacity (CEC) test on a soil sample collected from our explorations, and
- A review of published geologic and seismologic maps and literature.

Table 1 (below) summarizes the approximate functional location and termination depth of our subsurface exploration, and Figure 2 (attached) depicts the approximate relative location.

TABLE 1
APPROXIMATE LOCATION AND DEPTH OF EXPLORATION

Exploration	Functional Location	Termination Depth (feet)
TP-1	Approx. 155ft SE of rail depot building; 46.981908, -120.417417	10
TP-2	Approx. 55ft SSW of rail depot building; 46.982036, -120.418104	10

The specific number and location of our explorations were selected in relation to the proposed site features and budget considerations.

It should be realized that the exploration performed and utilized for this evaluation reveals subsurface conditions only at discrete locations across the project site and that actual conditions in other areas could vary. Furthermore, the nature and extent of any such variations would not become evident until additional explorations are performed or until construction activities have begun. If significant variations are observed at that time, we may need to modify our conclusions and recommendations contained in this report to reflect the actual site conditions.

The following sections describe the procedures used for excavation of test pits and infiltration field testing.

2.1 Test Pit Procedures

Our exploratory test pits were excavated with a rubber-tracked mini-excavator, operated by an excavation contractor under subcontract to Migizi Group, Inc. An engineering geologist from our firm observed the test pit excavations, collected soil samples, and logged the subsurface conditions.

The enclosed test pit logs indicate the vertical sequence of soils and materials encountered in each test pit, based on our field classifications. Where a soil contact was observed to be gradational or undulating, our logs indicate the average contact depth. We estimated the relative density and consistency of the in-situ soils by means of the excavation characteristics and the stability of the test pit sidewalls. Our logs also indicate the approximate depths of any sidewall caving or groundwater seepage observed in the test pits. The soils were classified visually in general accordance with the system described in Figure A-1, which includes a key to the exploration logs. Summary logs of the explorations are included as Figures A-2 through A-3.

2.2 Infiltration Test Procedures

In-situ field infiltration testing was performed to determine a Design Infiltration Rate in general accordance with the Small-Scale PIT procedures outlined in the 2019 Department of Ecology Stormwater Management Manual for Eastern Washington, Chapter 6, Section B.3 "Recommended Field Test Procedures" (pages 741 through 743).

The first step of this test procedure involved identifying a suitable soil stratum for stormwater retention. Once identified, an excavation was performed within this soil group, ensuring a minimum surface area of 12 square feet.

Upon completion of the excavation, a vertical measuring rod marked in half-inch increments was installed near the center of the test area. Water was then introduced into the test area through a 4-inch corrugated pipe, which directed the flow to a splash block at the bottom of the excavation. After accumulating 12 inches of water at the bottom of the excavation, the test surface was saturated before commencing the infiltration test. Following the saturation period, a steady state flow rate was established to maintain 12 inches of head at the bottom of the test surface for one hour. Once the steady state period concluded, water introduction ceased, and infiltration of the existing water was observed. We recorded a falling head rate for one hour and compared it to the steady state rate.

3.0 SITE CONDITIONS

The following sections present our observations, measurements, findings, and interpretations regarding surface, soil, groundwater, seismic and infiltration conditions, and liquefaction potential.

3.1 Surface Conditions

As previously indicated, the immediate project area of the Kittitas Historic Rail Depot is located along the southern end of the "T" intersection of Main Street and Railroad Avenue in Kittitas, WA. The entire parcel is approximately 2,780 feet east to west by 145 feet north to south, with

the immediate project area encompassing the existing rail depot, the "Cascade to Palouse" state park trail, and Wilson Park.
Topographically, the site is relatively flat, varying by only one to three feet across the parcel. Onsite are two existing structures, the historic railway depot building and a small, detached materials and tools shed. Both structures are wood framed with slab on grade floors. The property has maintained landscaping around the buildings and park area, with mature fir and deciduous trees and grass.

No hydrologic features such as seeps, springs, ponds, and streams were observed within the immediate project area. The project area, it should be noted, is located between two local creeks, with Cooke Creek approximately 1,350 feet to the west, and Caribou Creek approximately 1,500 feet to the east.

3.2 Soil Conditions

Our subsurface explorations revealed relatively consistent subgrade conditions across the proposed asphalt improvement area of the southern half of the project area, generally consisting of a surficial layer of dense non-native structural fill, underlain by several feet of soft, native, fine-grained flood plain deposits over medium dense coarse-grained gravel observed at the bottom of the explorations. Test pits were not excavated in landscaped areas of the park around the existing structures.

In general, the upper 1.5 to 2 feet consisted of a cap of dense crushed surfacing base course for existing parking and drive lanes across the site. This was underlain by a layer of dense angular shale gravel with medium dense coarse sandy gravel beneath it. This soil is likely a historic structural fill from when this site was an active railroad station and track line.

Beneath this dense gravelly fill lies soft, native alluvial soils. Beginning at approximately 2 feet below existing grades, soils consist of roughly 3 feet of soft, brown fine sandy silt. This soil is consistent with historic flood plain deposits from the Yakima River across the Kittitas Valley. Soils were generally moist with increased moisture content towards the bottom of the strata but were not observed to be mottled.

Underlying the fine-grained flood plain deposits are medium to coarse gravel with coarse sand. Gravels range in size from fine and coarse, with some larger cobbles observed. This layer of gravel was encountered as wet and medium dense to dense in nature with groundwater elevation observed towards the top of the gravel layer at roughly 6 feet below surrounding grade.

The Kittitas Valley basin, having not been directly affected by the scouring effects of the advance and retreat of the Okanogan Lobe of the Cordilleran Ice Sheet, or the resulting jökulhlaups (glacial outburst floods) from historic Glacial Lake Missoula to the east, sits in a tectonically unique location in Central Washington. Located towards the western extent of the Columbia Flood Plain basalts, this area of Central Washington has been subjected to large-scale tectonic compression in the past 10 million years, resulting in what is known as the Olympic-Wallowa Lineament (OWL). The OWL is a collection of NW-SE trending anticlinal-synclinal folds and thrust faults from the

eastern Olympic Mountains southeast to Rattlesnake Mountain and the Wallula Gap of the Columbia River.

Kittitas lies within the central portion of the OWL, referred to as the Cle Elum-Wallula deformation zone (CLEW). The most prominent topographic feature in the immediate area, Manashtash Ridge, lies to the south of the project area and is a 50-mile-long anticlinal mountain ridge, rising approximately 1,500 to 2,000 feet above the Kittitas Basin.

Much of the near-surface soil across the Kittitas Basin are Holocene to Pliocene-aged (<5.3 million years old) is comprised of various alluvial deposits. These loose sediments are generally derived from older volcanic bedrock from the surrounding uplifted hills and have been deposited by the meandering or overbank flooding of the Yakima River or smaller surrounding stream channels, and broad alluvial fans and debris flows coming off nearby hills. Alluvial soils generally consist of unconsolidated to poorly consolidated sands and gravels deposited across the basin, with finer-grained sands and silts deposited in the flood plains immediately adjacent to the current Yakima River channel.

The National Resource Conservation Survey (NRCS) for the project area shows the project area as dominated by two soil complexes (Fig. 3, below). The western half of the site is mapped as flood plain deposits comprised of ashy silt loam of the 791 – Mitta complex, while the eastern half is mapped as 635 – Opnish ashy loam. Soils were found to generally conform to the mapping of the NRCS, with thickened deposits of fine-grained sand and silt across the project area. It should be noted that during explorations, lenses or thin beds of volcanic ash were not observed in our explorations.

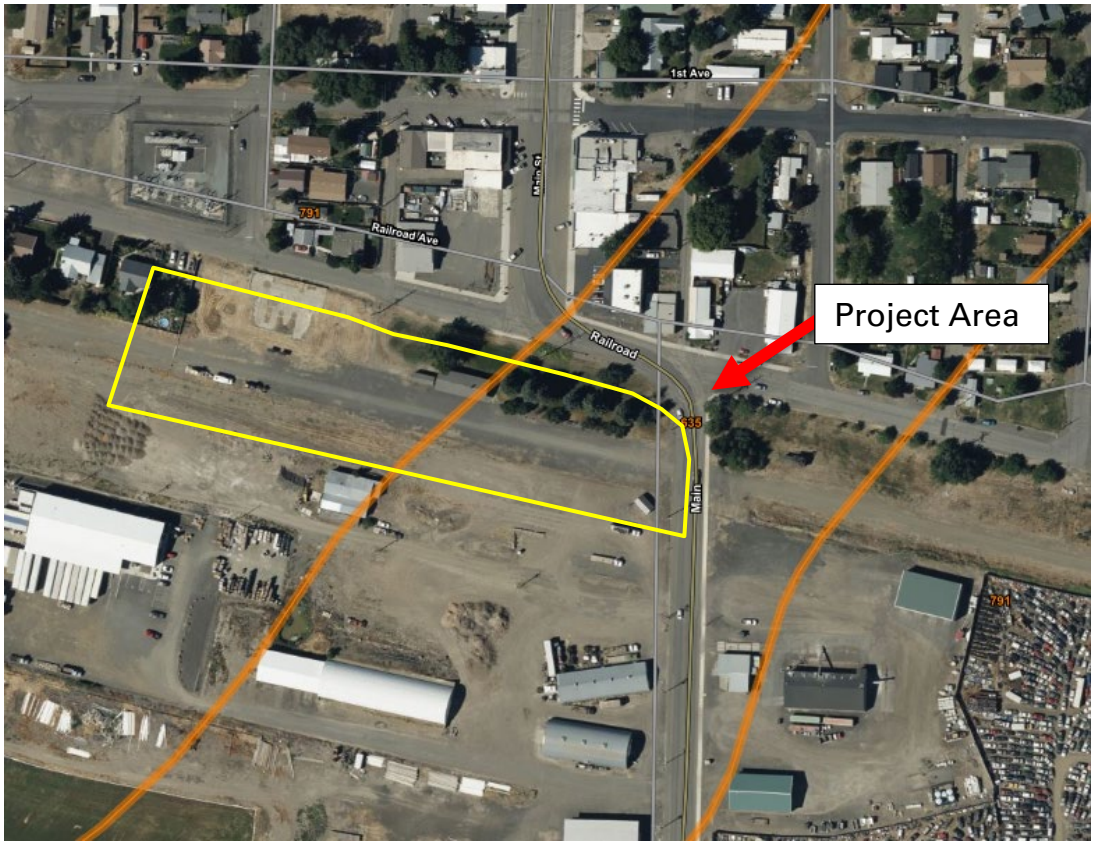


Fig. 3: Excerpt of local soil survey from National Resource Conservation Survey.

In the *Geologic Map of the Kittitas and East Kittitas 7.5-minute Quadrangle, Kittitas County, Washington* as prepared by the Washington State Department of Natural Resources (WSDNR) (2023), the project site is mapped as containing **ml**, or Holocene-aged, modified land. **Ml** soils are coarse-grained fill soils placed by manmade activities to modify topography for industrial, agricultural, or residential uses. Soils outside of this fill are classified as **Qia** – Intermediate-age alluvium. This soil group contains stream-flood deposits, which are generally confined to low-lying topography across the Kittitas Basin. An excerpt from the WSDNR publication is presented as Fig. 4 on the following page.

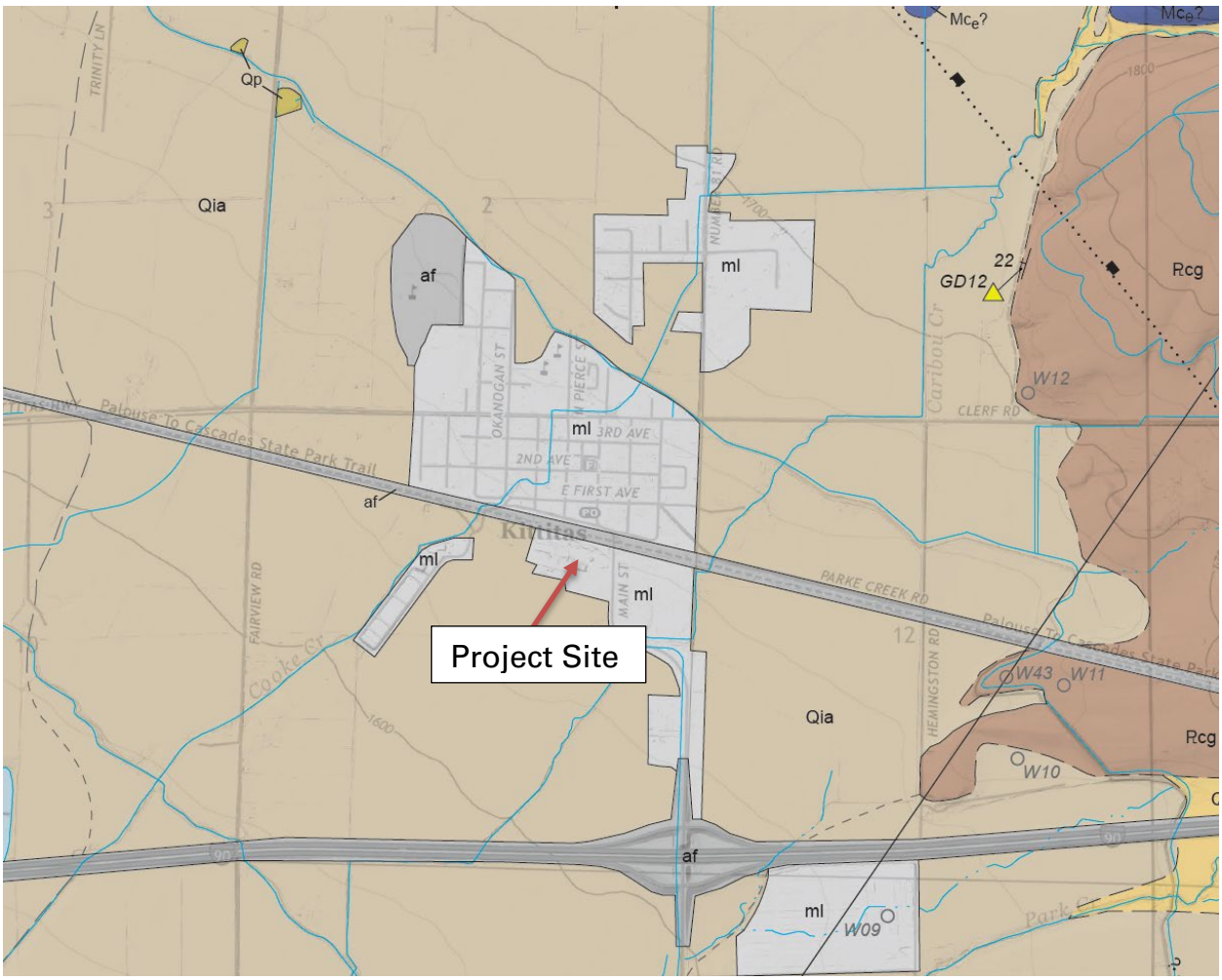


Fig. 4: Excerpt from *Geologic Map of the Ellensburg Quadrangle, Washington (WSDNR) (1983).*

Our subsurface observations generally conform with the classifications performed by both the NRCS and WSDNR. The enclosed exploration logs (Appendix A) provide a detailed description of the soil strata encountered in our subsurface exploration.

3.3 Groundwater Conditions

During our explorations of the subsurface on July 24, 2024, we encountered shallow groundwater in both excavations at depths of 5.75 and 6.0 feet below grade. As groundwater elevations were observed during the dry season, we believe that water levels may rise slightly during the winter season. In our opinion, the civil engineer for this project should use a high-water level of 5.5 feet below existing grade across the proposed improvement area. The depth to groundwater should be expected to vary with localized geology and seasonal precipitation. We were not contracted to install groundwater monitoring wells, perform a wet season of groundwater monitoring, or perform a groundwater mounding analysis.

3.4 Seismic Conditions

The site is located in Central Washington, east of the Cascade Mountains, within the Kittitas basin. This area is away from any major fault lines, such as the Seattle Fault, with most seismicity limited

to sub-3.5Mw events associated with the Yakima fold and thrust belt. A detailed description of the regional seismicity is beyond the scope of this report; however, previous regional earthquakes can be split into two general categories: 1.) large earthquakes with a moment magnitude greater than 8.0 ($M_W > 8.0$), and 2.) modest size earthquakes with a moment magnitude generally less than 7.25 ($M_W < 7.25$). In all cases, the thickness of the soil between the bedrock and the ground surface can change (usually amplify) the seismically induced ground motions and therefore the inertial loads acting on surface structures.

"Site Class" is a classification system used by the IBC and ASCE 7 to provide some insight to the potential for ground motion amplification. The site class is based on the properties of the upper 100 feet of the soil and rock materials at the site. MGI used a combination of onsite explorations and our review of the geologic mapping of the site to derive a site class for the site. Based on evaluation and the definitions of Site Class as provided in Table 20.3-1 of ASCE 7-16 (as required by the 2018 International Building Code), the soil conditions on this site satisfy the definition of Site Class D - Default. Our evaluation assumes the soil conditions encountered in the bottom of our explorations and those from nearby properties are similar to or increasing in density/consistency down to 100 feet below ground surface.

The 2018 IBC considers earthquake shaking to have a 2 percent probability of exceedance in 50 years (i.e. a 2475-year return period), as the code-based design requirement. Using the third-party graphical user interface tools made available by the USGS at https://seismicmaps.org, MGI derived the design ground motions to be used for design of the structures. Our evaluation used ASCE 7-16 as the code reference, Risk Category I/II/III, and Site Class D-Stiff Soil. The results of our evaluation are provided in Table 2 on the following page.

TABLE 2
SEISMIC DESIGN PARAMETERS

Parameter	Value	Basis
Site Class	D - Default	Table 20.3-1 of ASCE 7-16
S_S	0.478	seismicmaps.org
F_a	1.417	seismicmaps.org
S_{MS}	0.677	= $F_a \cdot S_S$, 2018 IBC Eqn. 16-36
S_{DS}	0.452	= $^2/_3$ S_{MS}, 2018 IBC Eqn. 16-38
S_1	0.197	seismicmaps.org
F_V	2.206 [B, C]	2018 IBC
S_{M1}	0.434 [B, C]	= $F_V \cdot S_1$, 2018 IBC Eqn. 16-37
S_{D1}	0.289 [B, C]	= $^2/_3$ S_{M1}, 2018 IBC Eqn. 16-39
PGA	0.211	seismicmaps.org
PGA_M	0.293g	seismicmaps.org
T_0	-- [C]	Not applicable
T_S	-- [C]	Not applicable
T_L	16 sec.	seismicmaps.org

Notes:
A. Use the value provided unless the simplified design procedure of ASCE 7 Section 12.14 is used. If this occurs, please contact our office for more information.
B. Based on Table 1613.2.3(2) of the 2018 IBC – An ASCE 7-16 Chapter 21 analysis has not been performed.
C. More detailed seismic design criteria are available upon request. Please contact MGI's office for more information.

3.5 Liquefaction Potential

Figure 5, reproduced on the following page, is an excerpt from the published Kittitas County Liquefaction Hazard Map by the WSDNR (2010). Based on local geology, the Washington State Department of Natural Resources interprets the site as having a low potential for seismically induced liquefaction.

Liquefaction is a sudden increase in pore water pressure and a sudden loss of soil shear strength caused by shear strains, as could result from an earthquake. Research has shown that saturated, loose, fine to medium sands with a fines content of less than about 20 percent are most susceptible to liquefaction. The site-specific subsurface explorations performed for this study did not encounter any saturated, loosely consolidated sandy soils. Observed soils below the groundwater table consisted of coarse-grained gravels with sand.

Based on these findings, should a significant seismic event occur, it is our opinion that any liquefaction in the site vicinity would result in little to no expression at the ground surface and subsurface liquefaction is likely to be discontinuous and isolated within subsurface soil layers.

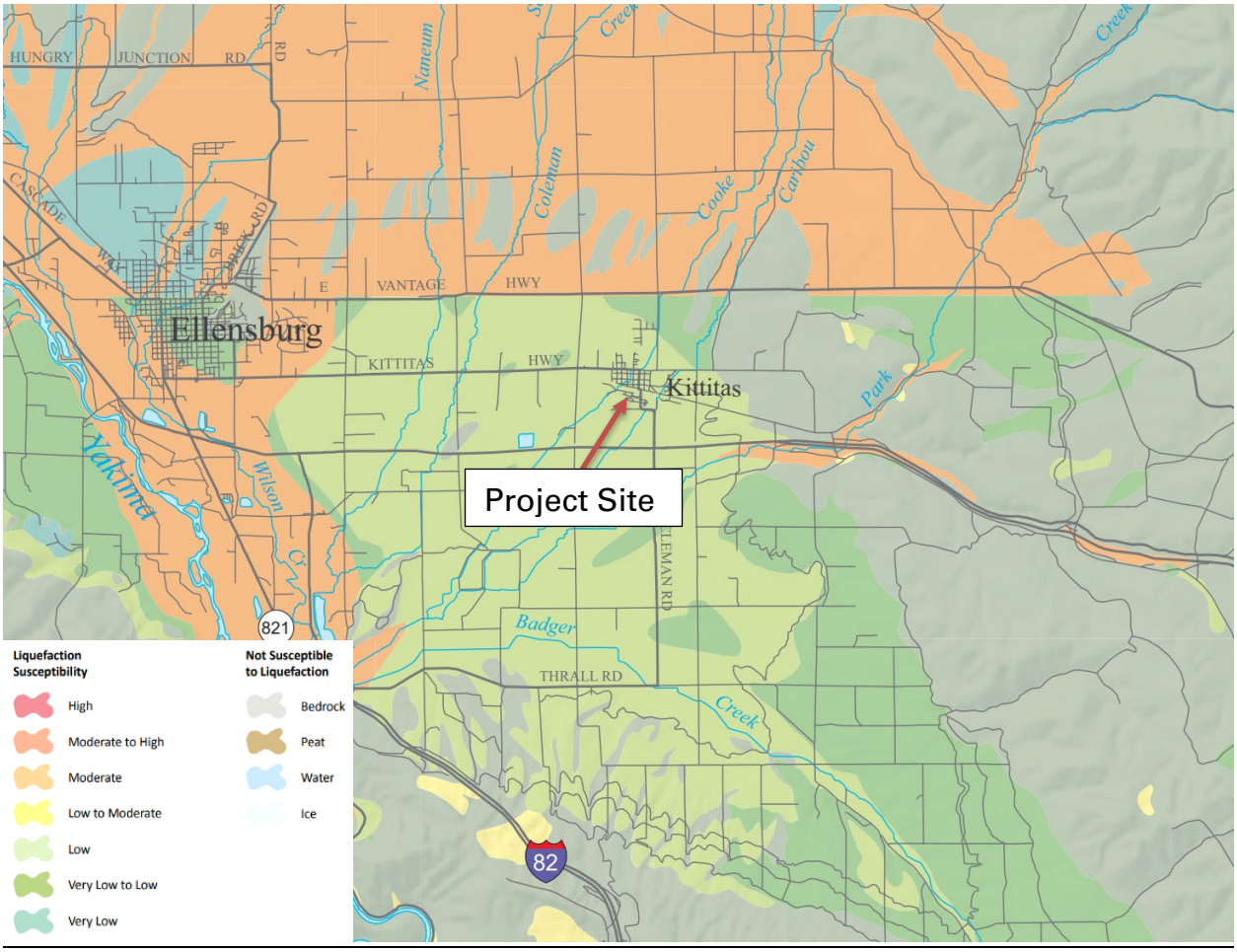


Fig. 5: Excerpt from *Kittitas County Liquefaction Susceptibility* map *(WSDNR) (2010).*

3.6 Infiltration Conditions

As indicated in the *Soil Conditions* section of this report, the project area is overlain by imported structural fill at the surface and fine-grained flood plain deposits beneath, comprised of fine sandy silt. This soil is generally poorly permeable and has the occasional likelihood of short-term flooding during heavy rain events. Underlying this horizon, we encountered very rapidly permeable, gravelly alluvial deposits that were observed to contain limited fines content.

While these gravels would represent a suitable horizon for infiltration purposes, during our reconnaissance, we observed that groundwater elevations were approximately 5.75 to 6 feet below grade and generally within the top 12 inches of this zone of gravel. As such, we do not believe that enough separation would be available between the bottom of an infiltration facility and the top of the local groundwater table to support feasible long-term infiltration at a high rate.

We performed a grain size analysis on one sample collected of the fine-grained shallow alluvial soils, with results shown in Table 3, and a gradational plot labeled as B-1 at the end of this report. Our analysis indicates that shallow soils are comprised of fine sandy silt while deeper soils consist of gravel with sand.

TABLE 3 LABORATORY TEST RESULTS FOR NON-ORGANIC ONSITE SOILS							
Soil Sample, Depth	**% Coarse Gravel**	**% Fine Gravel**	**% Coarse Sand**	**% Medium Sand**	**% Fine Sand**	**% Fines**	**D_{10}**
TP-1, S-2, 3 feet	2.8	2.8	1.5	6.0	39.9	47.0	0.18

Recommended Design Infiltration Rate

On July 24, 2024, a geologist from MGI performed field infiltration testing along the southern property line, just west of the proposed stormwater facility, utilizing the procedures described at the onset of this report at locations shown on the attached Figure 2. Testing was performed at the likely bottom of the proposed stormwater facility, using a rubber-tracked excavator to excavate the test surface and a shovel to clean up and prepare the test surface. Due to the significant soaking period as required in the testing methods of the Eastern Washington Department of Ecology Stormwater Manual, only a single small-scale PIT was performed with test results displayed in Table 4, below.

TABLE 4 FIELD INFILTRATION TEST RESULTS			
Test Number	**Location**	**Depth of Test (Inches)**	**Average Field Infiltration Rate (inches per hour)**
INF-1	~20 feet W of TP-1, along S property line	30	0.75

The results of the above listed field infiltration rate are further modified to produce a long-term infiltration rate through the application of several safety factors. The design rate is determined by the formula $K_{sat\ design} = K_{sat} \times (CFV \times CF_t \times CF_m \times CF_b)$. The four correction factors are multiplied together to create the total correction factor, CF_T, which is multiplied by the measured field infiltration rate to create a long-term design infiltration rate. CF_V is a measure of site variability, which we use herein as 1.0. CF_t, the testing method utilized, is given as 0.50 for a small-scale PIT. CF_m is a standard value to limit siltation and bio-buildup, provided as 0.9.

Utilizing the following values K_{sat} = 0.75 in/hr, CFt = 0.5, CFV = 1.0, and Fplugging = 0.9, we recommend a design infiltration rate of **0.33 inches per hour** for infiltration facilities utilizing the shallow, fine-grained alluvial floodplain deposits as the primary infiltrative medium. Such facilities should maintain an appropriate separation from the shallow observed groundwater.

Treatment Assessment

As part of our evaluation, we also submitted a sample of the shallow, fine-grained alluvial flood plain deposits to Northwest Agricultural Consultants for testing to determine the CEC and organic content of native soils. Table 5 (below) illustrates the results of the laboratory analysis:

TABLE 5 LABORATORY TEST RESULTS FOR TREATMENT CAPACITY OF ONSITE SOILS		
Soil Sample, Depth	**Organic Content (wt. % Dry)**	**Cation Exchange Capacity (CEC)(mEq/100g)**
INF-1, S-1, 3.0 feet	3.66	20.5

The Civil Engineer should evaluate the above results to determine if native soils are suitable for treatment. Laboratory results for the CEC and organic content prepared by Northwest Agricultural Consultants are attached as Appendix B.

4.0 CONCLUSIONS AND RECOMMENDATIONS

Development plans involve the minimal grading of the existing crushed rock driveway and parking along the south side of Wilson Park and the pre-existing railroad depot building. Improvement plans call for the grading of the parking area, and installation of new asphalt pavement, concrete curbline and poured concrete sidewalks. Additionally, the existing rail depot structure will have a new concrete perimeter foundation and new interior wooden posts and concrete footings installed, with the building being modernized after foundation work is completed. We offer the following recommendations:

- Feasibility: Based on our field exploration, research, and evaluations, the proposed structure improvements and pavements appear feasible from a geotechnical standpoint.
- Foundation Options: Based on subgrade soils observed in our explorations away from the building, we anticipate approximately 2 feet of suitably dense, non-native structural fill to underlie the existing building. Prior to construction of the new perimeter and interior foundation elements, subgrade soils should be observed by a geotechnical professional. Should subgrade soils be observed to be suitably dense, foundation elements may be constructed at grade without the need for over-excavation. If foundation construction occurs during wet conditions, it is likely that a geotextile fabric and/or packed layer of quarry spall rock may be necessary. Recommendations for spread footings are provided in Section 4.2.
- Floor Options: Based on subgrade soils observed in our explorations away from the building, we anticipate approximately 2 feet of suitably dense, non-native structural fill to underlie the existing building. Prior to replacement of the isolated columns and wooden posts supporting the existing wooden floor, subgrade soil should be observed by a geotechnical professional. Concrete pads should bear on properly compacted structural fill that extends down to medium dense or denser native soils. If structural fill is found to underlie the existing isolated concrete pads, reinforcement of new floor support elements should be incorporated to limit future damage to the floor. Recommendations for the isolated column footings and posts are included in Section 4.3. Structural fill underlying floor support elements should be compacted to 95 percent (ASTM:D-1557).
- Pavement Sections: Based on the observed in situ density of the existing structural fill, additional excavation or installation of structural fill should not be necessary We recommend a conventional pavement section comprising an asphalt concrete pavement over a crushed rock base course over a properly prepared (compacted) granular subbase. All soil subgrades should be thoroughly compacted, then proof rolled with a loaded dump truck or fully loaded water truck. Any localized zones of yielding subgrade observed during this proof-roll operation should be over-excavated to a depth of 12 inches and replaced with suitable imported structural fill material.

- Infiltration Conditions: With the preliminary location of the proposed infiltration facilities along the southern property line outside of the planned asphalt pavement area, infiltration appears feasible utilizing the shallow fine sandy silt alluvium that covers the site. Our subsurface explanations indicate that this soil group will contain adequate separation from both impermeable surfaces and groundwater to support slow infiltration and treatment of site produced stormwater. The shallow fine-grained alluvial sandy silt, as determined by field infiltration testing, should have a long-term design infiltration rate of **0.33 inches per hour**.
- Geologic Hazards: During our site reconnaissance, review of subsurface explorations, and general evaluation of the proposed development, we did not observe any seismic, settlement, erosional, or landslide geologic hazards within the subject site. Given this fact, we recommend that no buffers, setbacks, or other forms of site restraints be implemented to address these potential hazards.

The following sections of this report present our specific geotechnical conclusions and recommendations concerning site preparation, spread footings and bearing pads, slab-on-grade floors, asphalt surfacing, and structural fill. The Washington State Department of Transportation (WSDOT) Standard Specifications and Standard Plans cited herein refer to WSDOT publications M41-10, Standard Specifications for Road, Bridge, and Municipal Construction, and M21-01, Standard Plans for Road, Bridge, and Municipal Construction, respectively.

4.1 Site Preparation

Preparation of the project site should involve erosion control, temporary drainage, clearing, stripping, excavations, cutting, subgrade compaction, and filling.

Erosion Control: Before new construction begins, an appropriate erosion control system should be installed. This system should collect and filter all surface water runoff through silt fencing. We anticipate a system of berms and drainage ditches along the southern property line and around immediate construction areas will provide an adequate collection system. Silt fencing fabric should meet the requirements of WSDOT Standard Specification 9-33.2 Table 6. In addition, silt fencing should embed a minimum of 6 inches below existing grade. An erosion control system requires occasional observation and maintenance. Specifically, holes in the filter and areas where the filter has shifted above ground surface should be replaced or repaired as soon as they are identified.

Temporary Drainage: We recommend intercepting and diverting any potential sources of surface or near-surface water within the construction zones before stripping begins. Because the selection of an appropriate drainage system will depend on the water quantity, season, weather conditions, construction sequence, and contractor's methods, final decisions regarding drainage systems are best made in the field at the time of construction. Based on our current understanding of the construction plans, surface, and subsurface conditions, we anticipate that curbs, berms, or ditches placed around the work areas will adequately intercept surface water runoff.

Clearing and Stripping: After surface and near-surface water sources have been controlled, sod, topsoil, and root-rich soil should be stripped from the site. We performed no excavations in areas where topsoil was present. Should clearing and stripping be required, it is likely that the organic layer may reach thicknesses upwards of 6 to 9 inches around the proposed improvement area.

Site Excavations: Based on our exploration, we expect that excavations will encounter dense structural fill in pavement areas over fine-grained soft silty sand over medium dense to dense gravelly river deposits at depth, all of which can be easily excavated using standard excavation equipment.

Dewatering: Groundwater levels were observed to be between 5 to 6 feet below grade during the summer months. If groundwater is encountered during excavation operations, we anticipate that an internal system of ditches, sump holes, and pumps will be adequate to temporarily dewater shallow excavations. For deeper excavations encountering significant groundwater, the installation of well points or a designed dewatering system may become necessary to continue operations.

Temporary Cut Slopes: At this time, final designs and construction sequencing have not been completed. To facilitate project planning, we provide the following general comments regarding temporary slopes:

- All temporary soil slopes associated with site cutting or excavations should be adequately inclined to prevent sloughing and collapse,
- Temporary cut slopes in site soils should be no steeper than 1½H:1V, and
- Temporary slopes should conform to Washington Industrial Safety and Health Act (WISHA) regulations.

These general guidelines are necessarily somewhat conservative (steeper temporary slopes may be possible). As the project progresses, temporary grading plans are developed, final site features are better defined, and a contractor is engaged, MGI may modify these general guidelines to allow steeper slopes.

Subgrade Compaction: Exposed subgrades for the foundations of the planned structures should be compacted to a firm, unyielding state before new concrete or fill soils are placed. Any localized zones of loose granular soils observed within a subgrade should be compacted to a density commensurate with the surrounding soils. In contrast, any organic, soft, or pumping soils observed within a subgrade should be over excavated and replaced with a suitable structural fill material.

Site Filling: Our conclusions regarding the reuse of onsite soil and our comments regarding wet-weather filling are presented subsequently. Regardless of soil type, all fill should be placed and compacted according to our recommendations presented in the *Structural Fill* section of this report. Specifically, building pad fill soil should be compacted to a uniform density of at least 95 percent (based on ASTM:D-1557).

Onsite Soils: We offer the following evaluation of these onsite soils in relation to potential use as structural fill:

- *Surficial Organic Soil and Organic-Rich Topsoil:* Where encountered, surficial organic soils, like duff, topsoil, root-rich soil, and organic-rich fill soils are *not* suitable for use as structural fill under any circumstances, due to high organic content. Consequently, this material can be used only for non-structural purposes, such as in landscaping areas.
- *Gravelly Structural Fill*: The mixed-gravel structural fill which overlies the site in existing parking areas is recommended may be reused as structural fill and may be considered moisture sensitive due to the crushed rocks' fine-grained constituents. These mixed soils were observed to be 15 to 24 inches thick overlying native brown fine-grained soils.
- *Fine-Grained Alluvial*: The tan fine-grained sandy silt overlies the site can be reused as structural fill during extended dry weather conditions. It will be difficult to reuse as structural fill during wet weather due to moisture sensitivity.
- *Coarse-Grained Alluvial:* The gravelly meandering river deposits which underlies the fine-grained flood plain deposits are relatively insensitive to moisture content variations and can be reused year-round, provided particles larger than 6 inches are removed.

4.2 Spread Footings

Improvement plans for the rail depot structure call for the building to be raised and new conventional spread footings constructed around the perimeter. Based on our explorations outside of the building area, we anticipate that structural fill will continue under the existing building and that these fill soils will be suitably dense for support of any new building foundations. However, this should be verified during construction by a geotechnical professional. We offer the following comments and recommendations for spread footing design.

Footing Depths and Widths: For frost and erosion protection, the bases of all exterior footings should bear at least 18 inches below adjacent outside grades, whereas the bases of interior footings need bear only 12 inches below the surrounding slab surface level. To reduce post-construction settlements, continuous (wall) and isolated (column) footings should be at least 16 and 24 inches wide, respectively.

Bearing Subgrades: Foundation elements should bear on properly compacted structural fill soils. We anticipate that observed structural fill in the parking area will extend underneath the existing building and will be suitably dense to support foundation elements. The exposed subgrade soils should be observed prior to any forms or reinforcing bar being installed, to determine if any over-excavation of unsuitable material is required.

Exposed soils under all foundation elements for the proposed building improvements should be compacted to a density of at least 95 percent (based on ASTM: D-1557). If foundation work occurs during wet conditions, it is possible that a geotextile fabric, placed between the bearing pad and native soil, will be necessary. Refer to section 4.5 *Structural Fill* of this report.

In general, before footing concrete is placed, any localized zones of loose soils exposed across the footing subgrades should be compacted to a firm, unyielding condition, and any localized zones of soft, organic, or debris-laden soils should be over-excavated and replaced with suitable structural fill.

Lateral Over-Excavations: Because foundation stresses are transferred outward as well as downward into the bearing soils, all structural fill placed under footings should extend horizontally outward from the edge of each footing. This horizontal distance should be equal to the depth of placed fill. Therefore, in the event that structural fill in placed during over-excavation, fill that extends 2 feet below the footing base should also extend 2 feet outward from both the interior and exterior edges of all foundation elements.

Subgrade Observation: All foundation subgrades should consist of firm, unyielding, structural fill materials that have been compacted to a density of at least 95 percent (based on ASTM:D-1557). Footings should never be cast atop loose, soft, or frozen soil, slough, debris, existing uncontrolled fill, or surfaces covered by standing water.

Bearing Pressures: In our opinion, for static loading, footings that bear on dense, properly prepared subgrade can be designed for maximum allowable soil bearing pressure of 1,500 psf. A one-third increase in allowable soil bearing capacity may be used for short-term loads created by seismic or wind related activities.

Footing Settlements: Assuming that structural fill soils are compacted to a medium dense or denser state, we estimate that total post-construction settlements of properly designed footings bearing on properly prepared subgrades will not exceed 1 inch under static conditions. Differential settlements for comparably loaded elements may approach one-half of the actual total settlement over horizontal distances of approximately 50 feet.

Footing Backfill: To provide erosion protection and lateral load resistance, we recommend that all footing excavations be backfilled on both sides of the footings and stem walls after the concrete has cured. Either imported structural fill or non-organic onsite soils can be used for this purpose, contingent on suitable moisture content at the time of placement. Regardless of soil type, all footing backfill soil should be compacted to a density of at least 90 percent (based on ASTM:D-1557).

Lateral Resistance: Footings that have been properly backfilled as recommended above will resist lateral movements by means of passive earth pressure and base friction. We recommend using an allowable passive earth pressure of 225psf and an allowable base friction coefficient of 0.35 for site soils.

4.3 Post-Supported Floor

Improvement plans for the rail depot structure call for the building to be raised several inches, with existing wooden posts and isolated concrete pads to be replaced. In our opinion, isolated concrete pads and column supports can be used, if the subgrades are properly prepared. New

foundation elements should be designed in accordance with the recommendations for spread footings presented in Section 4.2, above.

Floor Subbase: All isolated concrete pads and column supports should bear suitably dense structural fill. We anticipate that the observed structural fill in the parking area will extend underneath the existing building and should be suitably dense for support. Prior to construction of any new floor elements, geotechnical observations should be scheduled in order to verify subgrade soil conditions. All new subbase fill should be compacted to a density of at least 95 percent (based on ASTM:D-1557).

Capillary Break and Vapor Barrier: We recommend that a layer of durable plastic sheeting (such as Crosstuff, Moistop, or Visqueen) be placed directly over the subgrade soils of the crawl space to limit moisture vapors from migrating upward into the crawl space. During construction, contractors should exercise care to avoid puncturing this vapor barrier.

4.4 Asphalt Pavement

Since asphalt pavements will also be used extensively for new drive lanes and automobile parking along the south side of the property, we offer the following comments and recommendations for pavement design and construction.

Subgrade Preparation: Based on observations in explorations across the existing parking area, the parking area is underlain by approximately 2 feet of suitably dense structural fill. We believe that this in situ fill will be suitably dense to support a typical asphalt pavement section without the need for over-excavation and replacement with imported structural fill.

Should the existing soil be left in place, all asphalt pavement areas should be thoroughly compacted then proof-rolled with a full water tanker truck or a loaded dump truck, under proper geotechnical observation. Any localized zones of yielding subgrade disclosed during this proof-rolling operation should be over excavated to a maximum depth of 18 inches and replaced with approved imported structural fill material.

All structural fill, including the granular subbase if needed, should be compacted according to our recommendations given in the Structural Fill section. Specifically, the upper 2 feet of soils underlying pavement section should be compacted to at least 95 percent (based on ASTM D-1557).

Pavement Materials: For the base course, we recommend using imported washed crushed rock, such as "Crushed Surfacing Base Course" per WSDOT Standard Specification 9-03.9(3) but with a fines content of less than 5 percent passing the No. 200 Sieve. Although our explorations do not indicate a need for a pavement subbase, if a subbase course is needed, we recommend using imported, clean, well-graded sand and gravel such as "Ballast" or "Gravel Borrow" per WSDOT Standard Specifications 9-03.9(1) and 9-03.14, respectively.

Conventional Asphalt Sections: A conventional pavement section typically comprises an asphalt concrete pavement over a crushed rock base course. We recommend using the following conventional pavement sections:

Minimum Thickness

Pavement Course	Automobile Parking Areas	Drive Lanes and Truck Parking Areas
Asphalt Concrete Pavement	3 inches	3 inches
Crushed Rock Base	4 inches	4 inches
Granular Fill Subbase (if needed)	18 inches	18 inches

Compaction and Observation: All subbase and base course material should be compacted to at least 95 percent of the Modified Proctor maximum dry density (ASTM D-1557), and all asphalt concrete should be compacted to at least 92 percent of the Rice value (ASTM D-2041). We recommend that an MGI representative be retained to observe the compaction of each course before any overlying layer is placed. For the subbase and pavement course, compaction is best observed by means of frequent density testing. For the base course, methodology observations and hand-probing are more appropriate than density testing.

Pavement Life and Maintenance: No asphalt pavement is maintenance-free. The above-described pavement sections present our minimum recommendations for an average level of performance during a 20-year design life; therefore, an average level of maintenance will likely be required. Furthermore, a 20-year pavement life typically assumes that an overlay will be placed after about 10 years. Thicker asphalt and/or thicker base and subbase courses would offer better long-term performance but would cost more initially; thinner courses would be more susceptible to "alligator" cracking and other failure modes. As such, pavement design can be considered a compromise between a high initial cost and low maintenance costs versus a low initial cost and higher maintenance costs.

Should pervious pavement be utilized in areas, the pervious pavement section should be designed and placed according to the manufacturer's recommendations.

4.5 Structural Fill

The term "structural fill" refers to any material placed under foundations, retaining walls, slab-on-grade floors, sidewalks, pavements, and other structures. Our comments, conclusions, and recommendations concerning structural fill are presented in the following paragraphs.

Materials: Typical structural fill materials include clean sand, gravel, pea gravel, washed rock, crushed rock, well-graded mixtures of sand and gravel (commonly called "gravel borrow" or "pit-run"), and miscellaneous mixtures of silt, sand, and gravel. Recycled asphalt, concrete, and glass, which are derived from pulverizing the parent materials, are also potentially useful as structural fill in certain applications. Soils used for structural fill should not contain any organic matter or debris, nor any individual particles greater than about 6 inches in diameter.

Fill Placement: Clean sand, gravel, crushed rock, soil mixtures, and recycled materials should be placed in horizontal lifts not exceeding 8 inches in loose thickness, and each lift should be thoroughly compacted with a heavy mechanical compactor.

Compaction Criteria: Using the Modified Proctor test (ASTM:D-1557) as a standard, we recommend that structural fill used for various onsite applications be compacted to the following minimum densities:

Fill Application	Minimum Compaction
Footing subgrade and bearing pad	95 percent
Foundation backfill	90 percent
Slab-on-grade floor subgrade and subbase	95 percent
Asphalt pavement base and subbase	95 percent
Asphalt pavement subgrade (upper 2 feet)	95 percent
Asphalt pavement subgrade (below 2 feet)	90 percent

Subgrade Observation and Compaction Testing: Regardless of material or location, all structural fill should be placed over firm, unyielding subgrades prepared in accordance with the *Site Preparation* section of this report. The condition of all subgrades should be observed by geotechnical personnel before filling or construction begins. Also, fill soil compaction should be verified by means of in-place density tests performed during fill placement so that adequacy of soil compaction efforts may be evaluated as earthwork progresses.

Soil Moisture Considerations: The suitability of soils used for structural fill depends primarily on their grain-size distribution and moisture content when they are placed. As the "fines" content (that soil fraction passing the U.S. No. 200 Sieve) increases, soils become more sensitive to small changes in moisture content. Soils containing more than about 5 percent fines (by weight) cannot be consistently compacted to a firm, unyielding condition when the moisture content is more than 2 percentage points above or below optimum. For fill placement during wet-weather site work, we recommend using "clean" fill, which refers to soils that have a fines content of 5 percent or less (by weight) based on the soil fraction passing the U.S. No. 4 Sieve.

5.0 RECOMMENDED ADDITIONAL SERVICES

Because the future performance and integrity of the structural elements will depend largely on proper site preparation, drainage, fill placement, and construction procedures, monitoring and testing by experienced geotechnical personnel should be considered an integral part of the construction process. Subsequently, we recommend that MGI be retained to provide the following post-report services:

- Review all construction plans and specifications to verify that our design criteria presented in this report have been properly integrated into the design,
- Prepare a letter summarizing all review comments (if required),
- Check all completed subgrades for footings and slab-on-grade floors before concrete is poured to verify their bearing capacity,
- Check prepared asphalt subgrades through visual observation (proof rolling) prior to paving operations, and

- Prepare a post-construction letter summarizing all field observations, inspections, and test results (if required).

6.0 CLOSURE

The conclusions and recommendations presented in this report are based, in part, on the explorations that we observed for this study; therefore, if variations in the subgrade conditions are observed at a later time, we may need to modify this report to reflect those changes.

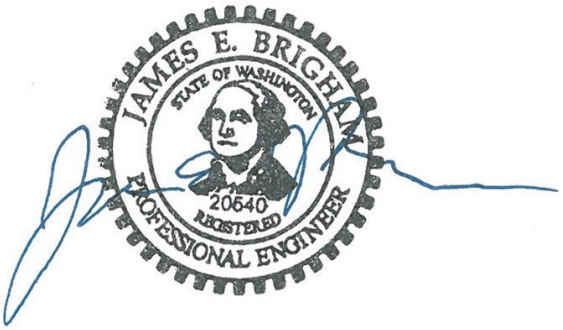
A full hydrologic study of the site and immediate area is beyond the scope of this geotechnical report. At the time of site reconnaissance and exploration, MGI was not requested to drill and install any groundwater well installation, perform wet season groundwater monitoring, or conduct a groundwater table mounding. Any conclusions drawn herein are solely based on observations made during site reconnaissance and explorations.

Also, because the future performance and integrity of the project elements depend largely on proper initial site preparation, drainage, and construction procedures, monitoring and testing by experienced geotechnical personnel should be considered an integral part of the construction process. MGI is available to provide geotechnical monitoring of soils throughout construction.

We appreciate the opportunity to be of service on this project. If you have any questions regarding this report or any aspects of the project, please feel free to contact our office.

Respectfully submitted,

MIGIZI GROUP, INC.



10/02/24

Randall V. Conger-Best, L.G.
Senior Staff Geologist

James E. Brigham, P.E.
Senior Principal Engineer

MIGIZI GROUP	Location **116 Main Street, Unit B Kittitas, WA 98934**	Job Number **Z0739**	Figure **1**
P.O. Box 44840 Tacoma, WA 98448	Title **Topographic and Location Map**		Date **07/29/24**

N

TEST PIT LOCATION
TP-1

INFILTRATION TEST LOCATION
INF-1

NOTE:
BOUNDARY AND TOPOGRAPHY ARE BASED ON MAPPING PROVIDED TO MIGIZI OBSERVATIONS MADE IN THE FIELD. THE INFORMATION SHOWN DOES NOT CONSTITUTE A FIELD SURVEY BY MIGIZI.

Migizi Group, Inc.
PO Box 44840
Tacoma, WA 98448
253-537-9400
253-537-9401 fax
www.migizigroup.com

PROJECT:	116 Main Street, Unit B Kittitas, WA 98934	
SHEET TITLE:	Site and Exploration Plan	
DESIGNER: RVCB		JOB NO. Z0739
DRAWN BY: RVCB		SCALE: NTS
CHECKED BY: JEB		FIGURE: 2
DATE: July 29, 2024		FILE: Fig2.dwg

APPENDIX A
SOIL CLASSIFICATION CHART AND KEY TO TEST DATA

TEST PIT

MAJOR DIVISIONS				TYPICAL NAMES
COARSE GRAINED SOILS More than Half > #200 sieve	GRAVELS MORE THAN HALF COARSE FRACTION IS LARGER THAN NO. 4 SIEVE	CLEAN GRAVELS WITH LITTLE OR NO FINES	GW	WELL GRADED GRAVELS, GRAVEL-SAND MIXTURES
			GP	POORLY GRADED GRAVELS, GRAVEL-SAND MIXTURES
		GRAVELS WITH OVER 15% FINES	GM	SILTY GRAVELS, POORLY GRADED GRAVEL-SAND-SILT MIXTURES
			GC	CLAYEY GRAVELS, POORLY GRADED GRAVEL-SAND-CLAY MIXTURES
	SANDS MORE THAN HALF COARSE FRACTION IS SMALLER THAN NO. 4 SIEVE	CLEAN SANDS WITH LITTLE OR NO FINES	SW	WELL GRADED SANDS, GRAVELLY SANDS
			SP	POORLY GRADED SANDS, GRAVELLY SANDS
		SANDS WITH OVER 15% FINES	SM	SILTY SANDS, POOORLY GRADED SAND-SILT MIXTURES
			SC	CLAYEY SANDS, POORLY GRADED SAND-CLAY MIXTURES
FINE GRAINED SOILS More than Half < #200 sieve	SILTS AND CLAYS LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS, OR CLAYEY SILTS WITH SLIGHT PLASTICITY
			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
			OL	ORGANIC CLAYS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACIOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS
			CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS			Pt	PEAT AND OTHER HIGHLY ORGANIC SOILS

	Modified California	RV	R-Value
	Split Spoon	SA	Sieve Analysis
	Pushed Shelby Tube	SW	Swell Test
	Auger Cuttings	TC	Cyclic Triaxial
	Grab Sample	TX	Unconsolidated Undrained Triaxial
	Sample Attempt with No Recovery	TV	Torvane Shear
CA	Chemical Analysis	UC	Unconfined Compression
CN	Consolidation	(1.2)	(Shear Strength, ksf)
CP	Compaction	WA	Wash Analysis
DS	Direct Shear	(20)	(with % Passing No. 200 Sieve)
PM	Permeability		Water Level at Time of Drilling
PP	Pocket Penetrometer		Water Level after Drilling(with date measured)

SOIL CLASSIFICATION CHART AND KEY TO TEST DATA

Figure A-1

MIGIZI GROUP

Migizi Group, Inc.
PO Box 44840
Tacoma, WA 98448
Telephone: 253-537-9400

TEST PIT NUMBER TP-1

Figure A-2

CLIENT Helix Design Group
PROJECT NAME Kittitas Rail Depot Restoration
PROJECT NUMBER Z0739
PROJECT LOCATION 116 Main St., Unit B
DATE STARTED 7/25/24 **COMPLETED** 7/25/24
GROUND ELEVATION 1644 ft **TEST PIT SIZE**
EXCAVATION CONTRACTOR WA Parks Dept.
GROUND WATER LEVELS:
EXCAVATION METHOD Rubber Tracked Mini Excavator
▽ **AT TIME OF EXCAVATION** 5.75 ft / Elev 1638.25 ft
LOGGED BY RVCB **CHECKED BY** JEB
AT END OF EXCAVATION ---
NOTES
AFTER EXCAVATION ---

DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
0.0		GP-GM		(GP-GM) Gray silty gravel with sand (Dense, Dry) 1.25in. minus crushed surfacing base course	1643.6
			0.4		
		GP-GM		(GP-GM) Brown gravel with sand and silt (Dense, Moist) Mixed angular railroad ballast rock	1643.3
			0.8		
	GB S-1	SP		(SP) Brown gravelly coarse sand (Medium Dense, Moist)	
			1.3		1642.7
				Black carbonized organics (Loose, Dry)	
			1.7		1642.3
2.5	GB S-2	SM		(SM) Brown fine silty sand (Soft, Moist) Alluvial flood plain deposits	
			4.8		1639.3
5.0		GP		(GP) Brown gravel with coarse sand, cobbles and scattered boulders (Dense, Wet)	
				▽	
7.5					
			8.0		1636.0

Minor caving observed below 5ft
Groundwater observed at 5.75ft

The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.

Bottom of test pit at 8.0 feet.

Migizi Group, Inc.
PO Box 44840
Tacoma, WA 98448
Telephone: 253-537-9400

TEST PIT NUMBER TP-2

Figure A-3

CLIENT Helix Design Group
PROJECT NAME Kittitas Rail Depot Restoration
PROJECT NUMBER Z0739
PROJECT LOCATION 116 Main St., Unit B
DATE STARTED 7/25/24 **COMPLETED** 7/25/24
GROUND ELEVATION 1644 ft **TEST PIT SIZE**
EXCAVATION CONTRACTOR WA Parks Dept.
GROUND WATER LEVELS:
EXCAVATION METHOD Rubber Tracked Mini Excavator
▽ **AT TIME OF EXCAVATION** 6.00 ft / Elev 1638.00 ft
LOGGED BY RVCB **CHECKED BY** JEB
AT END OF EXCAVATION ---
NOTES
AFTER EXCAVATION ---

DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
0.0		GP-GM		(GP-GM) Gray silty gravel with sand (Dense, Dry)	
			0.3	1.25in. minus crushed surfacing base course	1643.7
		GP-GM		(GP-GM) Brown silty gravel with sand (Medium Dense, Moist)	
			0.6		1643.4
		SP-SM		(SP-SM) Tan fine to coarse sand with silt and gravel (Medium Dense, Moist)	
			1.3		1642.8
2.5		SM		(SM) Brown fine silty sand (Soft, Moist) Alluvial flood plain deposits	
5.0					
			5.5		1638.5
		GP		(GP) Brown gravel with coarse sand, cobbles and scattered boulders (Dense, Wet)	
			7.0		1637.0

No caving observed.
Groundwater observed at 6ft

The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.

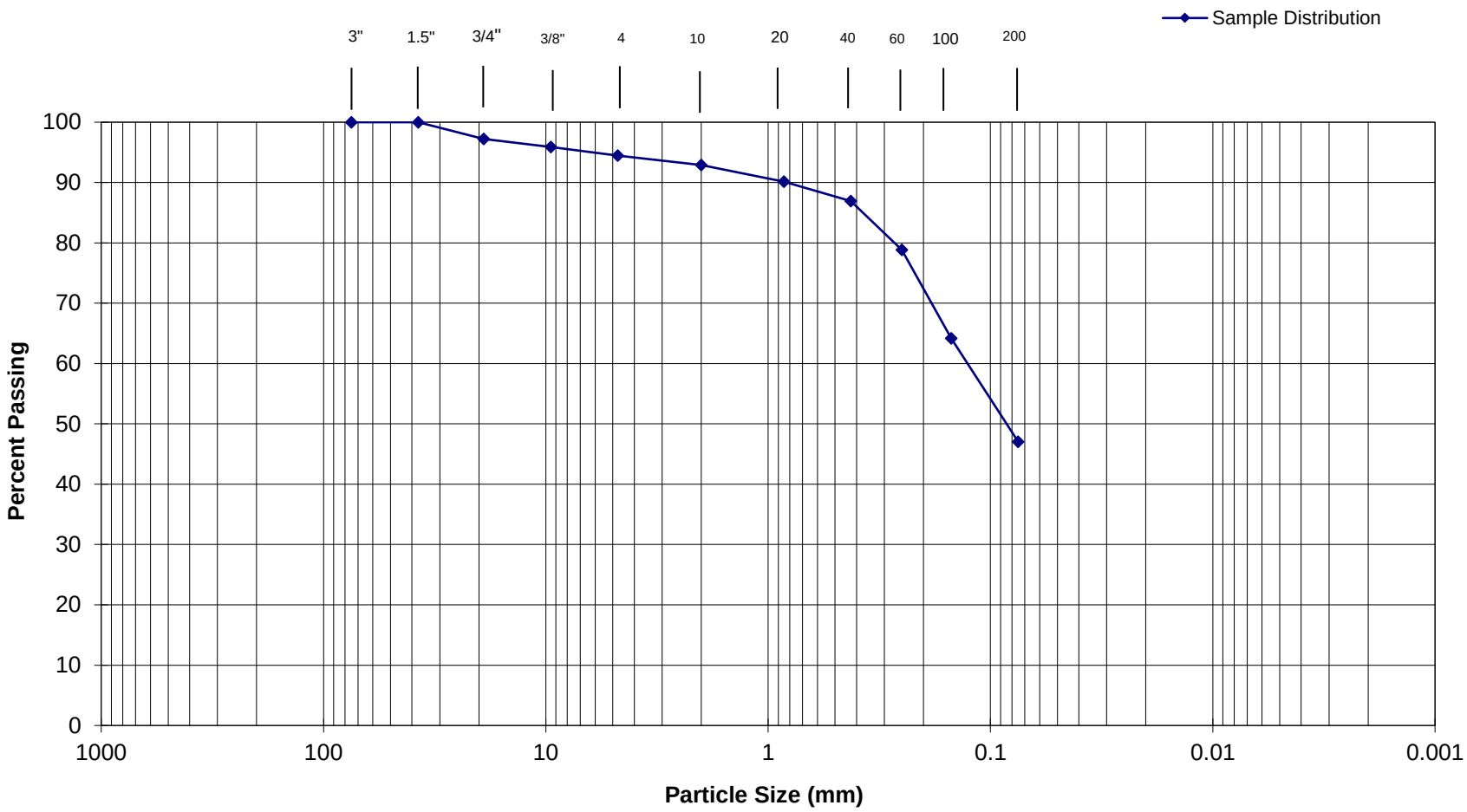
Bottom of test pit at 7.0 feet.

APPENDIX B

NORTHWEST AGRICULTURAL CONSULTANTS LAB TEST RESULTS

Sample Distribution

U.S. Standard Sieve Sizes



MIGIZI GROUP	**Sample Distribution**	Job Name:	Kittitas Rail Depot Restoration	Sample #:	S-2
		Job Number:	Z0739	Date:	8/1/24
	Figure:	Tested By:	ZLL	Depth:	3 feet
		Exploration #:	TP-1		

Northwest Agricultural Consultants

2545 W Falls Avenue
Kennewick, WA 99336
509.783.7450
www.nwag.com
lab@nwag.com

PAP-Accredited
NAPT

Migizi Group, INC
201 160th St. S. Ste. 401
Spanaway, WA 98387

Report: 69250-1-1
Date: August 02, 2024
Project No: Z0739
Project Name: Kittitas Rail Depot

Sample ID	Organic Matter	Cation Exchange Capacity
INF-1, S-1 @ 3’	3.66 %	20.5 meq/100g
Method	**ASTM D2974**	**EPA 9081**

1115A Walla Walla Ave, Ste 201
Wenatchee, WA 98801
(509) 782-8889
info@asbestoswenatchee.com

Asbestos Containing Materials and Lead-Based Paint Inspection

Inspection Date: 07/02/2024 Inspector: Josh Powell

Client Name: Washington State Parks
Site Address: Jct. of Railroad Ave. & Main St.
Kittitas, WA 98934

The Kittitas County Assessor's website does not have information regarding the building at the above location which was inspected by A1 Asbestos, LLC for asbestos containing building materials and lead-based paint. Josh Powell and Inspector with A1 Asbestos, LLC approximates the building was built in approximately 1919 and is approximately 800 square feet.

On **July 2, 2024** A1 Asbestos, LLC completed a limited asbestos and lead-based paint for the purpose of **renovating** the building, performed by an AHERA inspector and certified lead-based paint renovator at the above stated address. If any items are uncovered during future work that was not included in this report, work should stop and the additional items should be collected for asbestos and/or lead-based paint analysis.

Josh Powell (#180687), an Asbestos Hazard Emergency Response Act (AHERA) and **(R-R-9034WA-21-02119)**, a certified lead-based paint renovator with A1 Asbestos, LLC collected the

X

Josh Powell
AHERA Inspector

Certificate #180687 Exp. 02/21/25
Certificate #R-R-9034WA-21-02119 Exp. 03/15/26

Visual Inspection

Suspect asbestos materials identified during the inspection include:

Sample ID	Location/Description	Laboratory Material Name and Description / Color
FB-1	Throughout	Fiberboard / Brown
FB-2	Throughout	Fiberboard / Brown
FM-1	Bathroom	Linoleum / Green
FM-2	Bathroom	Linoleum / NOT ANALYZED
WG-1	Windows Throughout	Window Glazing / Red
WG-2	Windows Throughout	Window Glazing / Red

Inspector Notes: Customer requested these specific materials be collected for asbestos analysis prior to a demolition of the structure, during this specific inspection on this day.

Under AHERA inspection criteria, some materials can be assumed to be non-ACM based on manufacturers' labels, age, appearance, or inspector's expertise. The following materials were identified throughout the facility and were assumed to be non-ACM based on manufacturers' labels, age, appearance, or inspector's expertise:

Wood components, glass components, concrete components, metal components, fiberglass-like insulation.

ANALYSIS PROTOCOL: Environmental Protection Agency 40 CFR 763.87 **Analysis** notes in part: **(c.) (1)** A homogeneous area is considered not to contain ACM only if the results of all samples required to be collected from the area show asbestos in amounts of 1 percent or less.

(2) A homogenous area shall be determined to contain ACM based on a finding that the results of at least one sample collected from that area shows that asbestos is present in an amount greater than 1 percent.

The following samples were not analyzed due to the fact that the inspector asked the laboratory to not analyze homogenous samples that had a positive result. **FM-2**.

Asbestos Containing Materials Inspection

Asbestos inspection purpose is to be in compliance with regulatory requirements enforced by local, state, and federal agencies, including: 40 Code of Federal Regulations (CFR) Part 61 National Emission Standards for Hazardous Air Pollutants (NESHAP); 40 CFR Part 763 Asbestos Hazard Emergency Response Act (AHERA); 29 CFR Part 1926.1101 Asbestos; and Washington Administrative Code (WAC) 296-62-077, Asbestos, tremolite, anthophyllite, and actinolite. Under these regulations, an ACM is defined as any material containing greater than one (1) percent asbestos.

Suspect material identification and sample collection methodology were consistent with AHERA regulations. For AHERA sampling purposes, all materials were considered surfacing and or miscellaneous materials. Representative samples were collected from each identified suspect homogeneous material. Sample location identification represents the location where the material was collected and not every location where the material was present. All suspect ACM sampled during the inspection were shipped by common carrier, under chain of custody, to SanAir Technologies, located in Virginia, a National Voluntary Laboratory Accreditation Program (NVLAP) certified laboratory (#200870-0). Samples were analyzed using Polarized Light Microscopy (OLM) method EPA 600/R-93/116. Final analytical results can be found in Attachment A.

Samples that could be separated into multiple layers in the laboratory were analyzed by individual layer. Except in specific cases, individual layer analysis, rather than composite analysis, is the determining factor in declaring a material an ACM or a non-ACM. For report identification purposes, the layers received a letter designation. The sample results are presented in Attachment A. **Results indicated in bold represent samples containing greater than 1% asbestos, the regulatory definition of an asbestos containing material.**

Asbestos containing materials (ACM) were used extensively from the early 1900s to the late 1970s, when the manufacture of most asbestos products was banned in the U.S. The ban did not include all products nor the use and application of asbestos products. Therefore, suspect ACM may be present in structures built after the initial ACM ban and in newly constructed facilities. Since the 1990s, importation of building materials from foreign countries, perhaps unknowingly, has resulted in the use of ACM in new construction.

Recommendations

Laboratory analysis identified ONE (1) material to be asbestos containing.

Sample ID #	Location / Description	Type & % of Asbestos
FM-1 / 24036870-003	**Bathroom / Linoleum / Green**	**20% Chrysotile**

Asbestos was detected at this location based on the sampling. Asbestos containing building materials are to be remediated by an accredited abatement contractor prior to demolition, restoration, or remodel. This should be completed considering all federal, state, and local regulations. If additional suspected asbestos containing materials are discovered, it should be treated as positive for asbestos and abated properly unless accredited lab sampling under proper protocol confirms otherwise.

Limitations

A1 Asbestos, LLC's scope of services for this project was limited to the sampling of the building located at the above stated address. Results are specific to the time and day of the inspection and may not reflect conditions at other times. A1 Asbestos makes no warranties, expressed or implied as to the accuracy or completeness of other's work herein. This survey is provided for the materials tested as outlined in the Visual Inspection section of this report. It is possible that additional suspect asbestos containing building materials (ACBM) exist at this location. If ACBM not sampled/addressed in this report are to be involved in demolition, renovation, or remodeling, additional sampling should be completed by an AHERA certified building inspector and subsequently analyzed by an accredited lab considering appropriate protocol. If not tested, these suspected materials should be treated as asbestos containing materials.

A1 Asbestos has performed these services in accordance with generally accepted industry standards of care at the time of the inspection. No warranty, expressed or implied, is made. Our services consist of professional opinions made in accordance with rules and regulations guided by AHERA inspection standards as well as WAC regulations as they exist at the time of this report. This report has been prepared exclusively for the use of **Washington State Parks -Kittitas Depot**; we cannot be responsible for any other use of this report.

Certifications

A1 Asbestos is certified by Labor and Industries, The Department of Health, Puget Sound Clean Air Agency, National Institute of Occupational Safety and Health and The Environmental Protection Agency. We use certified methods approved by the Department of Ecology.

STATE CONTRACTOR CERTIFICATION #A1ASBAL903OZ (Exp. 09/10/24)
STATE CONTRACTOR ABATEMENT CERTIFICATION #1506 (Exp. 09/10/24)
DEPT OF COMMERCE LEAD BASE PAINT CERTIFICATION #4097 (Exp. 10/01/25)

If the scope of work should change, or if new suspect materials are identified, the contractors should stop work and contact A1 Asbestos, LLC to conduct additional sampling and analysis. This report was prepared by Hanna Aaron under the supervision and approval of Josh Powell, AHERA Building Inspector.

If you have any questions, or need further assistance, please feel free to contact us at (509) 782-8889.

Sincerely,

Hanna Aaron
Assistant Office Manager

SanAir Technologies Laboratory

The Identification Specialists

Analysis Report prepared for A1 Asbestos, LLC

Report Date: 7/9/2024

Project Name: WA State Parks-Kittitas Depot

Project #: A-24-1202R (A)

SanAir ID#: 24036870

NVLAP TESTING

NVLAP LAB CODE 200870-0

10501 Trade Court | North Chesterfield, Virginia 23236
888.895.1177 | 804.897.1177 | fax: 804.897.0070 | IAQ@SanAir.com | SanAir.com

SanAir Technologies Laboratory

SanAir ID Number
24036870
FINAL REPORT
7/9/2024 2:29:21 PM

Name: A1 Asbestos, LLC
Address: 1115A Walla Walla Ave
Ste. 201
Wenatchee, WA 98801
Phone: 509-782-8889

Project Number: A-24-1202R (A)
P.O. Number: Railroad Ave & Main St Kittitas, WA 9893
Project Name: WA State Parks-Kittitas Depot
Collected Date: 7/2/2024
Received Date: 7/3/2024 10:15:00 AM

Dear Josh Powell,

We at SanAir would like to thank you for the work you recently submitted. The 6 sample(s) were received on Wednesday, July 03, 2024 via UPS. The final report(s) is enclosed for the following sample(s): FB-1, FB-2, FM-1, FM-2, WG-1, WG-2.

These results only pertain to this job and should not be used in the interpretation of any other job. This report is only complete in its entirety. Refer to the listing below of the pages included in a complete final report.

Sincerely,

Sandra Sobrino
Asbestos & Materials Laboratory Manager
SanAir Technologies Laboratory

Final Report Includes:
- Cover Letter
- Analysis Pages
- Disclaimers and Additional Information

Sample conditions:
- 6 samples in Good condition.

SanAir Technologies Laboratory

SanAir ID Number
24036870
FINAL REPORT
7/9/2024 2:29:21 PM

Name: A1 Asbestos, LLC
Address: 1115A Walla Walla Ave Ste. 201
Wenatchee, WA 98801
Phone: 509-782-8889

Project Number: A-24-1202R (A)
P.O. Number: Railroad Ave & Main St Kittitas, WA 9893
Project Name: WA State Parks-Kittitas Depot
Collected Date: 7/2/2024
Received Date: 7/3/2024 10:15:00 AM

Analyst: Sanchez, Meivis

Asbestos Bulk PLM EPA 600/R-93/116

	Stereoscopic	Components		
SanAir ID / Description	Appearance	% Fibrous	% Non-fibrous	Asbestos Fibers
FB-1 / 24036870-001 Fiberboard	Brown Fibrous Homogeneous	90% Cellulose	10% Other	None Detected
FB-2 / 24036870-002 Fiberboard	Brown Fibrous Heterogeneous	90% Cellulose	10% Other	None Detected
FM-1 / 24036870-003 Linoleum/Bathroom	Green Non-Fibrous Heterogeneous	20% Cellulose	60% Other	20% Chrysotile
FM-2 / 24036870-004 Linoleum/Bathroom				Not Analyzed
WG-1 / 24036870-005 Window Glazing	Red Non-Fibrous Homogeneous	< 1% Cellulose	100% Other	None Detected
WG-2 / 24036870-006 Window Glazing	Red Non-Fibrous Homogeneous	< 1% Cellulose	100% Other	None Detected

Analyst: Meivis Sanchez
Analysis Date: 7/9/2024

Approved Signatory: Johnathan Wilson
Date: 7/9/2024

Disclaimer

This report is the sole property of the client named on the SanAir Technologies Laboratory chain-of-custody (COC). Results in the report are confidential information intended only for the use by the customer listed on the COC. Neither results nor reports will be discussed with or released to any third party without our client's written permission. The final report shall not be reproduced except in full without written approval of the laboratory to assure that parts of the report are not taken out of context. This report and any information contained within shall not be edited, altered, or modified in any way by any persons or agencies receiving, viewing, distributing, or otherwise possessing a copy of this final report. The laboratory reserves the right to perform amendments to any finalized report, of which shall supersede and make obsolete any previous editions. Such changes, modifications, additions, or deletions shall be effective immediately upon notice thereof, which may be given by means including but not limited to posting on the SanAir client portal website, electronic or conventional mail, or by any other means. The information provided in this report applies only to the samples submitted and is relevant only for the date, time, and location of sampling. The accuracy of the results is dependent upon the client's sampling procedure and information provided to the laboratory by the client on the COC. SanAir assumes no responsibility for the sampling procedure and will provide evaluation reports based solely on the sample(s) in the condition in which they arrived at the laboratory and information provided by the client on the COC, such as: project number, project name, collection dates, po number, special instructions, samples collected by, sample numbers, sample identifications, sample type, selected analysis type, flow rate, total volume or area, and start stop times that may affect the validity of the results in this report. Samples were received in good condition unless otherwise noted on the report. SanAir assumes no responsibility or liability for the manner in which the results are used or interpreted. This report does not constitute nor shall not be used by the client to claim product, process, system, or person certification, approval, or endorsement by NVLAP, NIST, NELAC, AIHA LAP, LLC or any other U.S. governmental agencies and may not be accredited by every local, state, and federal regulatory agencies. Samples are held for a period of 60 days. Fibers smaller than 5 microns cannot be seen with this method due to scope limitations. For NY state samples, method EPA 600/M4-82-020 is performed.

NYELAP Disclaimer:
Polarized- light microscopy is not consistently reliable in detecting asbestos in floor covering and similar non-friable organically bound materials. Quantitative transmission electron microscopy is currently the only method that can be used to determine if this material can be considered or treated as non-asbestos containing.

Asbestos Accreditations
National Voluntary Laboratory Accreditation Program (NVLAP) Lab Code 200870-0
City of Philadelphia Department of Public Health Air Management Services, Certification#ALL-460
Commonwealth of Pennsylvania Department of Environmental Protection Number 68-05397
California State Environmental Laboratory Accreditation Program Certificate Number 2915
Colorado Department of Public Health and Environment Registration Number AL-23143
Connecticut Department of Public Health Environmental Laboratory Registration Number PH-0105
Massachusetts Department of Labor Standards Asbestos Analytical Services License Number: AA000222
State of Maine Department of Environmental Protection License Number: LB-0075, LA-0084
New York State Department of Health Laboratory ID: 11983
State of Rhode Island Department of Health Certification No.: PCM00126, PLM00126, TEM00126
Texas Department of State Health Services License Number: 300440
Commonwealth of Virginia Department of Professional and Occupational Regulation Number: 3333000323
State of Washington Department of Ecology Laboratory ID: C989
State of West Virginia Bureau for Public Health Analytical Laboratory Number: LT000616
Vermont Department of Health License Number: Asb-Co-An-000006
Louisiana Department of Environmental Quality AI Number 212253, Certificate #05088

SanAir Technologies Laboratory
10501 Trade Ct., Suite 100
N. Chesterfield, VA 23236
804.897.1177 / 888.895.1177
Fax 804.897.0070
sanair.com

Asbestos Chain of Custody

Form 140, Rev 6, 1/26/2022

SanAir ID Number: 24036870

Company: A1 Asbestos, LLC	Project #: A-24-1202R(A)	Collected by: Josh Powell
Address: 1115A Walla Walla Ave Ste 201	Project Name: WA State Parks- Kittitas Depot	Phone #: 509-782-8889
City, St., Zip: Wenatchee, WA 98801	Date Collected: 07/02/2024	Fax #: 888-971-3456
State of Collection: WA Account#: 2499	P.O. Number: Railroad Ave & Main St Kittitas, WA 98934	Email: tpowell@asbestoswenatchee.com

Bulk

ABB	PLM EPA 600/R-93/116	✓
	Positive Stop ✓	
ABEPA	PLM EPA 400 Point Count	☐
ABB1K	PLM EPA 1000 Point Count	☐
ABBEN	PLM EPA NOB**	☐
ABBCH	TEM Chatfield**	☐
ABBTM	TEM EPA NOB**	☐
ABQ	PLM Qualitative	☐

** Available on 24-hr. to 5-day TAT

Water

ABHE	EPA 100.2	☐

Air

ABA	PCM NIOSH 7400	☐
ABA-2	OSHA w/ TWA*	☐
ABTEM	TEM AHERA	☐
ABATN	TEM NIOSH 7402	☐
ABT2	TEM Level II	☐
Other:		☐

New York ELAP

ABEPA2	NY ELAP 198.1	☐
ABENY	NY ELAP 198.6 PLM NOB	☐
ABBNY	NY ELAP 198.4 TEM NOB	☐

Soil

ABSE	PLM EPA 600/R-93/116 (Qual.)	☐

Soil

ABSP	PLM CARB 435 (LOD <1%)	☐
ABSP1	PLM CARB 435 (LOD 0.25%)	☐
ABSP2	PLM CARB 435 (LOD 0.1%)	☐

Dust

ABWA	TEM Wipe ASTM D-6480	☐
ABDMV	TEM Microvac ASTM D-5755	☐

Matrix	Other	
		☐

Turn Around Times				
	3 HR (4 HR TEM) ☐	6 HR (8HR TEM) ☐	12 HR ☐	1 Day ☐
	☐ 2 Days	■ 3 Days	☐ 4 Days	☐ 5 Days

Special Instructions

Sample #	Sample Identification/Location	Volume or Area	Sample Date	Flow Rate*	Start – Stop Time*	
FB-1	fiberboard	TBD	07/02/2024	PS	-	-
FB-2	fiberboard	TBD	07/02/2024	/	-	-
FM-1	green linoleum/bathroom	TBD	07/02/2024	PS	-	-
FM-2	green linoleum/bathroom	TBD	07/02/2024	/	-	-
WG-1	window glazing	TBD	07/02/2024	PS	-	-
WG-2	window glazing	TBD	07/02/2024	/	-	-

Relinquished by	Date	Time	Received by	Date	Time
Josh Powell	07/02/2024	130	JML	7/3/24	1015am

If no technician is provided, then the primary contact for your account will be selected. Unless scheduled, the turnaround time for all samples received after 3 pm EST will be logged in the next business day. Weekend or holiday work must be scheduled ahead of time and is charged at 150% of the 3hr TAT or a minimum charge of $150. A courier charge will be applied for same day and one-day turnaround times for offsite work. SanAir covers Ground and Next Day Air shipping. Shipments billed to SanAir with a faster shipping rate will result in additional charges.

A1 ASBESTOS ENVIRONMENTAL SERVICES

1115A Walla Walla Ave Suite 201
Wenatchee, WA 98801
(509) 782-8889
info@asbestoswenatchee.com

Lead Based Paint Inspection Report

Inspection Date: 07/02/2024 Certified Renovator: Joshua Powell

Client: Washington State Parks -Kittitas Depot

Site Address: Junction of Railroad Ave. & Main St.
Kittitas, WA 98934

A1 Asbestos, LLC collected suspect lead-based paint samples on 07/02/2024 A1 Asbestos is certified by the State of Washington and the Department of Commerce under the EPA's Renovation, Repair, and Painting (RRP) Rule to collect paint chip samples to determine whether lead-based paint is present on components to be disturbed during a renovation.

Visual Inspection

Suspect lead-based paint materials identified on the interior and exterior of the building include; Interior Light Green Paint on Fiberboard (x2 samples), Interior Dark Green Paint on the Windows/Doors/Trim (x2 samples), Interior Wallboard tongue and groove (x2 samples), Exterior Orange Base Paint (x2 samples), and Exterior Red Trim Paint (x2 samples).

Suspect material identification and sample collection methodology were consistent with EPA's RRP Rule. All suspect lead-based samples were shipped by common carrier, under chain of custody, to SanAir Technologies, located in Powhatan Virginia, an accredited environmental lead laboratory through AIHA Laboratory Accreditation Programs, LLC (#162952). Final Analytical results can be found in Attachment A. **Sample results containing greater than 0.5% by weight, the regulatory definition of a lead-based paint, are lead containing.**

Analysis & Recommendations

Laboratory analysis identified SEVEN (7) materials to be lead-based paint: Samples of Interior Light Green Paint on Fiberboard (IP-1) contains .612% by weight; Interior Light Green Paint on Fiberboard (IP-2) contains .652% by weight; Interior Wallboard tongue and groove (IP-5) contains 2.213% by weight; Interior Wallboard tongue and groove (IP-6) contains 1.805% by weight; Exterior Orange Base Paint (EP-1) contains 12.620% by weight; Exterior Orange Base Paint (EP-2) contains 15.040% by weight; Exterior Red Trim Paint (EP-4) contains 11.990% by weight, all are lead-based paint according to the HUD definition of a lead-based paint containing 0.5% by weight. A1 Asbestos, LLC recommends the Interior Light Green Paint on Fiberboard, Interior Wallboard tongue and groove, Exterior Orange Base Paint and Exterior Red Trim Paint, as specified on the report, be professionally addressed by a certified RRP Firm prior to commencing any work.

A1 ASBESTOS
ENVIRONMENTAL SERVICES

1115A Walla Walla Ave Suite 201
Wenatchee, WA 98801
(509) 782-8889
info@asbestoswenatchee.com

Limitations

A1 Asbestos, LLC's scope of services for this project was limited to the sampling of residence located at the above stated address. Results are specific to the time and day of inspection and may not reflect conditions at other times. A1 Asbestos makes no warranties, expressed or implied as to the accuracy of completeness of other's work herein.

A1 Asbestos has performed these services in accordance with generally accepted industry standards of care at the time of the inspection. No warranty, expressed or implied, is made. Our services consist of professional opinions made in accordance with EPA's RRP Rule as they exist at the time of this report. This report has been prepared exclusively for the use of Washington State Parks -Kittitas Depot; we cannot be responsible for any other use of the report.

Certifications

A1 Asbestos is certified by Labor and Industries, The Department of Health, Puget Sound Clean Air Agency, National Institute of Occupational Safety and Health and The Environmental Protection Agency. We use certified methods approved by EPA's RRP Rule.

STATE CONTRACTOR CERTIFICATION #A1ASBAL903OZ (Exp. 09/10/24)
STATE CONTRACTOR ABATEMENT CERTIFICATION #1506 (Exp. 09/10/24)
DEPT OF COMMERCE LEAD BASE PAINT CERTIFICATION #4097 (Exp. 10/01/25)

If the scope of work should change, or if new suspect materials are identified, the contractors should stop work and contact A1 Asbestos, LLC to conduct additional sampling and analysis. This report prepared by Hanna Aaron under the supervision and approval of Joshua Powell, RRP Certified Renovator.

If you have any questions, or need further assistance, please feel free to call us at (509) 782-8889.

Sincerely,

Hanna Aaron
Assistant Office Manager

Lead-Based Paint Inspection Report
Jct. of Railroad Ave & Main St. Kittitas, WA 98934

SanAir Technologies Laboratory

The Identification Specialists

Analysis Report prepared for A1 Asbestos, LLC

Report Date: 7/9/2024

Project Name: WA State Parks-Kittitas Depot

Project #: A-24-1202R(L)

SanAir ID#: 24036872

10501 Trade Court | North Chesterfield, Virginia 23236
888.895.1177 | 804.897.1177 | fax: 804.897.0070 | IAQ@SanAir.com | SanAir.com

SanAir ID Number
24036872
FINAL REPORT
7/9/2024 4:43:10 PM

Name: A1 Asbestos, LLC
Address: 1115A Walla Walla Ave Ste. 201
Wenatchee, WA 98801
Phone: 509-782-8889

Project Number: A-24-1202R(L)
P.O. Number: Railroad Ave & Main St Kititas, WA 98934
Project Name: WA State Parks-Kittitas Depot
Collected Date: 7/2/2024
Received Date: 7/3/2024 10:15:00 AM

Dear Josh Powell,

We at SanAir would like to thank you for the work you recently submitted. The 10 sample(s) were received on Wednesday, July 03, 2024 via UPS. The final report(s) is enclosed for the following sample(s): IP-1, IP-2, IP-3, IP-4, IP-5, IP-6, EP-1, EP-2, EP-3, EP-4.

These results only pertain to this job and should not be used in the interpretation of any other job. This report is only complete in its entirety. Refer to the listing below of the pages included in a complete final report.

Sincerely,

Abisola Kasali
Metals Laboratory Director
SanAir Technologies Laboratory

Final Report Includes:
- Cover Letter
- Analysis on Test Family AA
- Disclaimers and Additional Information

Sample conditions:
- 10 samples in Good condition.

SanAir Technologies Laboratory

SanAir ID Number
24036872
FINAL REPORT
7/9/2024 4:43:10 PM

Name: A1 Asbestos, LLC
Address: 1115A Walla Walla Ave Ste. 201
Wenatchee, WA 98801
Phone: 509-782-8889

Project Number: A-24-1202R(L)
P.O. Number: Railroad Ave & Main St Kititas, WA 98934
Project Name: WA State Parks-Kittitas Depot
Collected Date: 7/2/2024
Received Date: 7/3/2024 10:15:00 AM

Analyst: Robinson, Drake
Test Method: SW846/M3050B/7000B

Lead Paint Analysis

PAINT Sample	Description	µg Pb In Sample	Sample Size (grams)	Calculated RL	Sample Results	Sample Results
24036872 - 1	IP-1 Interior Light Green Paint-Fiberboard	664	0.1085	92.2	6116 µg/g (ppm)	0.612 % By Weight
24036872 - 2	IP-2 Interior Light Green Paint-Fiberboard	664	0.1018	98.2	6518 µg/g (ppm)	0.652 % By Weight
24036872 - 3	IP-3 Interior Dark Green Paint-Windows/Doors/Trim	294	0.1017	98.3	2891 µg/g (ppm)	0.289 % By Weight
24036872 - 4	IP-4 Interior Dark Green Paint-Windows/Doors/Trim	300	0.1049	95.3	2857 µg/g (ppm)	0.286 % By Weight
24036872 - 5	IP-5 Interior/Wallboard Tongue And Groove	2299	0.1039	96.2	22130 µg/g (ppm)	2.213 % By Weight
24036872 - 6	IP-6 Interior/Wallboard Tongue And Groove	1960	0.1086	92.1	18040 µg/g (ppm)	1.805 % By Weight
24036872 - 7	EP-1 Exterior Orange Base Paint	13670	0.1083	92.3	126200 µg/g (ppm)	12.620 % By Weight
24036872 - 8	EP-2 Exterior Orange Base Paint	15930	0.1059	94.4	150400 µg/g (ppm)	15.040 % By Weight
24036872 - 9	EP-3 Exterior Red Trim Paint	550	0.1233	81.1	4464 µg/g (ppm)	0.446 % By Weight
24036872 - 10	EP-4 Exterior Red Trim Paint	12160	0.1014	98.6	119900 µg/g (ppm)	11.990 % By Weight

Method Reporting Limit <10 µg/0.1 g paint

Samples IP-1, IP-2, IP-3, IP-4, and IP-5 contained substrate. Sample EP-1 matrix spike failed

Signature: Drake Robinson
Date: 7/8/2024

Reviewed:
Date: 7/8/2024

Disclaimer

SanAir Technologies Laboratory, Inc. participates in the Environmental Lead Accreditation Program (ELAP) administered by AIHA LAP, LLC (Laboratory ID LAP-162952). Refer to our accreditation certificate and scope on our website or www.aihaaccreditedlabs.org for an up to date list of the Fields of Testing for which we are accredited. SanAir also participates in the State of New York's DOH-ELAP (Lab Id 11983), and has met the EPA's NLLAP program standards. This report does not constitute nor shall be used by the client to claim product, process, system, or person certification, approval, or endorsement by AIHA LAP, LLC, NELAC, NIST, and/or any other U.S. governmental agencies; and test results in this report may not be accredited by every local, state or federal regulatory agency.

This report is the sole property of the client named on the SanAir Technologies Laboratory chain-of-custody (COC). Results in the report are confidential information intended only for the use by the customer listed on the chain of custody. Neither results nor reports will be discussed with or released to any third party without our client's written permission. Final reports cannot be reproduced, except in full, without written authorization from SanAir Technologies Laboratory, Inc. This report and any information contained within shall not be edited, altered, or modified in any way by any persons or agencies receiving, viewing, distributing, or otherwise possessing a copy of this final report. The laboratory reserves the right to perform amendments to any finalized report, of which shall supersede and make obsolete any previous editions. Such changes, modifications, additions, or deletions shall be effective immediately upon notice thereof, which may be given by means including but not limited to posting on the SanAir client portal website, electronic or conventional mail, or by any other means. The information provided in this report applies only to the samples submitted and is relevant only for the date, time, and location of sampling. The accuracy of the results of the analysis is dependent upon the method of sample procurement and information provided by the client on the COC. SanAir is not responsible for the method of sample procurement. SanAir assumes no responsibility for information provided by the client on the COC such as project number, project name, collection dates, po number, special instructions, samples collected by, sample numbers, sample identifications, sample type, selected analysis type, flow rate, total volume or area, and start stop times that may affect the validity of the results in this report. SanAir Technologies Laboratory, Inc only assures the precision and accuracy of the data it generates and assumes no responsibility for errors or biasing that occur during collection prior to SanAir's receipt of the sample(s). Evaluation reports are based solely on the sample(s) in the condition in which they arrived at the laboratory and on the information provided by the client on the COC. Sample(s) were received in good condition unless otherwise noted on the report. SanAir assumes no responsibility or liability for the manner in which the results are used or interpreted. SanAir's Method Detection Limits (MDL) and Reporting Limits (RL) have been derived using various materials meeting each accrediting agencies' standards. All quality control results are acceptable unless otherwise noted. SanAir does not make contamination corrections to reports based upon analysis of laboratory and/or field blanks. All samples are disposed of after 90 days unless otherwise requested by the client. For Lead Exposure Limits, refer to HUD Guidelines for the Evaluation and Control of Lead-Based Paint Hazards and State and Federal Regulations, where applicable. For Lead Exposure Limits in Air, refer to EPA National Ambient Air Quality Standards, OSHA Action Levels & Permissible Exposure Limits (General Industry & Construction), and relative state or federal requirements where applicable.

AIHA LAP, LLC Lab ID: LAP-162952
Commonwealth of VA Department of General Services DCLS, VELAP Laboratory ID#460251
New York State Department of Health Laboratory ID No: 11983
California State Environmental Laboratory Accreditation Program Certificate No: 2915
State of Connecticut Department of Public Health Environmental Laboratory Registration Number: PH-0105
New Jersey Department of Environment Protection Environmental Laboratory Certification ID# VA014
Ohio Department of Health Environmental Lead Laboratory Approval Number E10049
State of Rhode Island Department of Health Environmental Lead Laboratory No LAO00371

SanAir Technologies Laboratory
10501 Trade Ct.
N. Chesterfield, VA 23236-3993
804.897.1177 / 888.895.1177
Fax 804.897.0070
sanair.com

Metals & Lead Chain of Custody

Form 70, Revision 11, 09/21/21

SanAir ID Number: 2403687 2

Company: A1 Asbestos, LLC	Project #: A-24-1202R(L)	Phone #: 509-782-8889
Address: 1115A Walla Walla Ave Ste 201	Project Name: WA State Parks- Kittitas Depot	Phone #: 509-881-0074
City, St., Zip: Wenatchee, WA 98801	Date Collected: 07/02/2024	Fax #: 888-971-3456
Samples Collected By: Josh Powell	P.O. Number: Railroad Ave & Main St Kittitas, WA 98934	Email: tpowell@asbestoswenatchee.com
Account #: 2499	U.S. State Collected in: WA	Email:

Matrix Types

- ☐ **Air** (ug/m³)
- ☐ **Wipe** (ug/ft²)
- ☑ **Paint** ☐ **Soil** ☐ **Bulk** (ug/g or ppm)
- ☐ **Other:**

Metals Analysis Types

- Total Concentration of Lead ☑
- Total Concentration of RCRA 8 Metals ☐
- TCLP for Lead ☐
- TCLP for RCRA 8 Metals ☐
- ☐ ICP-total concentration of metals (please list metals):

Turn Around Time				
	Same Day ☐	1 Day ☐	2 days ☐	3 Days ☑
	☐ 4 Days	☐ Standard (5 day)	☐ Other Test:	

Sample #	Collection Date & Time	Sample Identification/Location	Flow Rate	Start Time	Stop Time	Volume (L) Area (Sq ft)
IP-1	07/02/2024	interior Light green paint-fiberboard				
IP-2	07/02/2024	interior Light green paint-fiberboard				
IP-3	07/02/2024	interior dark green paint-windows/doors/trim				
IP-4	07/02/2024	interior dark green paint-windows/doors/trim				
IP-5	07/02/2024	interior/ wallboard tongue and groove				
IP-6	07/02/2024	interior/ wallboard tongue and groove				
EP-1	07/02/2024	exterior orange base paint				
EP-2	07/02/2024	exterior orange base paint				
EP-3	07/02/2024	exterior red trim paint				
EP-4	07/02/2024	exterior red trim paint				

Special Instructions

Relinquished by	Date	Time	Received by	Date	Time
Josh Powell	07/02/2024	300	SMC	7/3/24	10:15am

If no technician is provided, then the primary contact for your account will be selected. Unless scheduled, the turnaround time for all samples received after 3 pm EST will be logged in the next business day. Weekend or holiday work must be scheduled ahead of time and is charged at 150% of the 3hr TAT or a minimum charge of $150. A courier charge will be applied for same day and one-day turnaround times for offsite work. SanAir covers Ground and Next Day Air shipping. Shipments billed to SanAir with a faster shipping rate will result in additional charges.

Page 1 of 1

United States Department of Commerce
National Institute of Standards and Technology

Certificate of Accreditation to ISO/IEC 17025:2017

NVLAP LAB CODE: 200870-0

SanAir Technologies Laboratory, Inc.

N. Chesterfield, VA

is accredited by the National Voluntary Laboratory Accreditation Program for specific services, listed on the Scope of Accreditation, for:

Asbestos Fiber Analysis

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communique dated January 2009).

2024-04-01 through 2025-03-31

Effective Dates

For the National Voluntary Laboratory Accreditation Program

National Voluntary Laboratory Accreditation Program

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

SanAir Technologies Laboratory, Inc.
10501 Trade Court
N. Chesterfield, VA 23236
Ms. Sandra Sobrino
Phone: 804-897-1177 Fax: 804-897-0070
Email: ssobrino@sanair.com
http://www.sanair.com

ASBESTOS FIBER ANALYSIS — NVLAP LAB CODE 200870-0

Bulk Asbestos Analysis

Code	*Description*
18/A01	EPA -- 40 CFR Appendix E to Subpart E of Part 763, Interim Method of the Determination of Asbestos in Bulk Insulation Samples
18/A03	EPA 600/R-93/116: Method for the Determination of Asbestos in Bulk Building Materials

Airborne Asbestos Analysis

Code	*Description*
18/A02	U.S. EPA's "Interim Transmission Electron Microscopy Analytical Methods-Mandatory and Nonmandatory-and Mandatory Section to Determine Completion of Response Actions" as found in 40 CFR, Part 763, Subpart E, Appendix A.

For the National Voluntary Laboratory Accreditation Program

Certificate of Completion

This is to certify that

Joshua M. Powell

has satisfactorily completed
4 hours of online refresher training as an

AHERA Building Inspector

to comply with the training requirements of

TSCA Title II, 40 CFR 763 (AHERA)

EPA Provider # 1085

192667
Certificate Number

Instructor: Sue Maas

Feb 21, 2024 Expires in 1 year.
Date(s) of Training

Exam Score: N/A
(if applicable)

Terracon
Explore with us

- Facilities
- Environmental
- Geotechnical
- Materials

AIHA Laboratory Accreditation Programs, LLC

acknowledges that

SanAir Technologies Laboratory, Inc.

10501 Trade Court N. Chesterfield, VA 23236

Laboratory ID: LAP-162952

along with all premises from which key activities are performed, as listed above, has fulfilled the requirements of the AIHA Laboratory Accreditation Programs (AIHA LAP), LLC accreditation to the ISO/IEC 17025:2017 international standard, General Requirements for the Competence of Testing and Calibration Laboratories in the following:

LABORATORY ACCREDITATION PROGRAMS

☑	**INDUSTRIAL HYGIENE**	Accreditation Expires: June 01, 2024
☑	**ENVIRONMENTAL LEAD**	Accreditation Expires: June 01, 2024
☑	**ENVIRONMENTAL MICROBIOLOGY**	Accreditation Expires: June 01, 2024
☐	**FOOD**	Accreditation Expires:
☐	**UNIQUE SCOPES**	Accreditation Expires:

Specific Field(s) of Testing (FoT)/Method(s) within each Accreditation Program for which the above named laboratory maintains accreditation is outlined on the attached Scope of Accreditation. Continued accreditation is contingent upon successful on-going compliance with ISO/IEC 17025:2017 and AIHA LAP, LLC requirements. This certificate is not valid without the attached Scope of Accreditation. Please review the AIHA LAP, LLC website (www.aihaaccreditedlabs.org) for the most current Scope.

Cheryl O. Morton

Cheryl O Morton
Managing Director, AIHA Laboratory Accreditation Programs, LLC

Revision20: 06/07/2022

Date Issued: 06/09/2022

Northwest Independent Contractors Association

NICA

Certificate of Attendance and Successful Completion

RENOVATOR REFRESHER - ENGLISH

PER 40 CFR 745.222 AND WAC 365-230

CERTIFICATE: R-R-9034WA-21-02119

Joshua Powell

7869 Stine Hill Rd Cashmere WA 98815

Lead Instructor

Training Manager, Kris Alberti

Course Date: 03/15/2021

Exam Date: 03/15/2021

Expiration Date: 3/15/2026

NICA I WA DOC Accreditation #9034 I 1900 Number 2 Canyon Rd., Wenatchee, WA 98801 I nicasafety.com I 509-246-9080

Structural Calculations

PREPARED FOR:

Helix Design Group
A Division of Shive-Hattery
6021 12th St E
Tacoma, WA 98424

PROJECT:

Kittitas Depot Historic Preservation
2230784.20

PREPARED BY:

Andrew McEachern, P.E., S.E.
Principal

DATE:

August 2024

Structural Calculations

Kittitas Depot

Historic Preservation

Project # 2230784.20

Project Principal Andrew D. McEachern, P.E., S.E.

Design Criteria

Design Codes and Standards

Codes and Standards: Structural design and construction shall be in accordance with the applicable sections of the following codes and standards as adopted and amended by the local building authority: International Building Code, 2021 Edition and International Existing Building Code, 2021 Edition.

Structural Design Criteria:

Live Load Criteria:

Roof (Min Blanket Snow):	30 psf
Existing Floor Framing:	50 psf
Mechanical Mezzanine:	50 psf
Slab on Grade:	125 psf

Wind Load Criteria:

Basic Wind Speed:	99 mph
Risk Category:	II
Wind Exposure:	C
Topographic Factor:	1.0

Seismic Criteria:

Risk Category:	II
Seismic Importance Factor:	1.0
S_s = 0.478	S_1 = 0.197
S_{ds} = 0.452	S_{d1} = 0.29
Site Class:	D - default
Seismic Design Category:	D
Response Modification Coeff. (R):	2.0 (LFSW)

Soil Criteria:

Soil Bearing Capacity: 1,500 psf (assumed) allow 33% increase for wind or seismic loads.

Active Earth Pressure	=	35 pcf
At Rest Earth Pressure	=	50 pcf
Seismic Earth Pressure	=	10 x “H” psf
Friction Coefficient	=	0.35
Passive Pressure	=	250 pcf

Project Description

The structural scope of work for this project involves structural design of minor improvements to an existing one-story conventional wood framed structure with a crawlspace. It is the intention of the structural design to satisfy the force levels of the IBC 2021 and IEBC 2021. Upgrades to existing elements of the vertical and / or lateral force resisting systems will only be performed at elements where load increases and member stresses exceed the thresholds of the IEBC. All new structural elements will be designed to meet the requirements of the 2021 IBC.

The structural system for the building consists of the following:

Roof / Ceiling Framing:

Timber sheathing spanning between conventional wood joists located at the roof and ceiling elevation. Diagonal 2x members are provided between the ceiling and roof members to create truss elements. The trusses span between exterior load bearing wood stud walls.

Floor Framing:

Timber decking spanning between conventional 2x wood joists. The joists span between timber beams at the exterior perimeter of the building as well as an interior beam line running down the middle of the crawlspace. The beams span between timber posts.

A new mechanical attic will be provided within the existing building. The attic framing will consist of plywood sheathing spanning between conventional 2x joists.

Foundations:

The existing foundations consist of a mixture of original timber foundations as well as upgraded shallow concrete foundations. It is the intent of the project to replace all of the existing building foundations with conventional shallow concrete strip and spread footings.

Exterior and Interior Wall Framing:

All interior and exterior walls consist of conventional 2x wood studs. At the building exterior, the studs are sheathed with timber siding, which will provide some lateral force resistance.

Evaluation of Existing Building Systems

The existing building structural systems have been evaluated to comply with the 2021 International Existing Building Code (IEBC). Structural upgrades have been provided only at members where the vertical loads have been increased. Any new structural members have been designed to meet the requirements of the 2021 International Building Code (IBC). No improvements to the lateral force resisting system are anticipated, as the stresses within the existing elements of the lateral force resisting system have not been increased by the proposed modifications.

CHAPTER 4
REPAIRS

User note:

About this chapter: *Chapter 4 provides requirements for repairs of existing buildings. The provisions define conditions under which repairs may be made using materials and methods like those of the original construction or the extent to which repairs must comply with requirements for new buildings.*

SECTION 401
GENERAL

401.1 Scope. *Repairs* shall comply with the requirements of this chapter. *Repairs* to *historic buildings* need only comply with Chapter 12.

401.1.1 Bleachers, grandstands and folding and telescopic seating. *Repairs* to existing bleachers, grandstands and folding and telescopic seating shall comply with ICC 300.

401.2 Compliance. The work shall not make the building less complying than it was before the *repair* was undertaken.

[BS] 401.3 Flood hazard areas. In flood hazard areas, *repairs* that constitute *substantial improvement* shall require that the building comply with Section 1612 of the *International Building Code*, or Section R322 of the *International Residential Code*, as applicable.

SECTION 402
BUILDING ELEMENTS AND MATERIALS

402.1 Glazing in hazardous locations. Replacement glazing in hazardous locations shall comply with the safety glazing requirements of the *International Building Code* or *International Residential Code* as applicable.

Exception: Glass block walls, louvered windows and jalousies repaired with like materials.

SECTION 403
FIRE PROTECTION

403.1 General. *Repairs* shall be done in a manner that maintains the level of fire protection provided.

SECTION 404
MEANS OF EGRESS

404.1 General. *Repairs* shall be done in a manner that maintains the level of protection provided for the means of egress.

SECTION 405
STRUCTURAL

[BS] 405.1 General. Structural *repairs* shall be in compliance with this section and Section 401.2.

[BS] 405.2 Repairs to damaged buildings. *Repairs* to damaged buildings shall comply with this section.

[BS] 405.2.1 Repairs for less than substantial structural damage. Unless otherwise required by this section, for damage less than *substantial structural damage*, the damaged elements shall be permitted to be restored to their predamage condition.

[BS] 405.2.1.1 Snow damage. Structural components whose damage was caused by or related to snow load effects shall be repaired, replaced or altered to satisfy the requirements of Section 1608 of the *International Building Code*.

[BS] 405.2.2 Disproportionate earthquake damage. A building assigned to Seismic Design Category D, E or F that has sustained *disproportionate earthquake damage* shall be subject to the requirements for buildings with substantial structural damage to vertical elements of the lateral force-resisting system.

[BS] 405.2.3 Substantial structural damage to vertical elements of the lateral force-resisting system. A building that has sustained *substantial structural damage* to the vertical elements of its lateral force-resisting system shall be evaluated in accordance with Section 405.2.3.1, and either repaired in accordance with Section 405.2.3.2 or repaired and retrofitted in accordance with Section 405.2.3.3, depending on the results of the evaluation.

Exceptions:

1. Buildings assigned to Seismic Design Category A, B or C whose *substantial structural damage* was not caused by earthquake need not be evaluated or retrofitted for load combinations that include earthquake effects.
2. One- and two-family dwellings need not be evaluated or retrofitted for load combinations that include earthquake effects.

[BS] 405.2.3.1 Evaluation. The building shall be evaluated by a registered design professional, and the evaluation findings shall be submitted to the *code official*. The evaluation shall establish whether the damaged building, if repaired to its predamage state, would comply with the provisions of the *International Building Code* for load combinations that include wind or earthquake effects, except that the seismic forces shall be the reduced seismic forces.

CHAPTER 5
PRESCRIPTIVE COMPLIANCE METHOD

User note:

About this chapter: *Chapter 5 provides details for the prescriptive compliance method—one of the three main options of compliance available in this code for buildings and structures undergoing alteration, addition or change of occupancy.*

SECTION 501
GENERAL

501.1 Scope. The provisions of this chapter shall control the *alteration*, *addition* and *change of occupancy* of *existing buildings* and structures, including *historic buildings* and structures as referenced in Section 301.3.1.

➡ **501.1.1 Compliance with other methods.** *Alterations*, *additions* and *changes of occupancy* to *existing buildings* and structures shall comply with the provisions of this chapter or with one of the methods provided in Section 301.3.

501.2 Fire-resistance ratings. Where *approved* by the *code official*, in buildings where an automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2 of the *International Building Code* has been added, and the building is now sprinklered throughout, the required fire-resistance ratings of building elements and materials shall be permitted to meet the requirements of the current building code. The building is required to meet the other applicable requirements of the *International Building Code*.

Plans, investigation and evaluation reports, and other data shall be submitted indicating which building elements and materials the applicant is requesting the *code official* to review and approve for determination of applying the current building code fire-resistance ratings. Any special construction features, including fire-resistance-rated assemblies and smoke-resistive assemblies, conditions of occupancy, means of egress conditions, fire code deficiencies, *approved* modifications or *approved* alternative materials, design and methods of construction, and equipment applying to the building that impact required fire-resistance ratings shall be identified in the evaluation reports submitted.

501.3 Health care facilities. In Group I-2 *facilities*, ambulatory care *facilities* and outpatient clinics, any altered or added portion of an existing electrical or medical gas systems shall be required to meet installation and equipment requirements in NFPA 99.

SECTION 502
ADDITIONS

502.1 General. *Additions* to any building or structure shall comply with the requirements of the *International Building Code* for new construction. *Alterations* to the *existing building* or structure shall be made to ensure that the *existing building* or structure together with the *addition* are not less complying with the provisions of the *International Building Code* than the *existing building* or structure was prior to the *addition*. An *existing building* together with its *additions* shall comply with the height and area provisions of Chapter 5 of the *International Building Code*.

[BS] 502.2 Disproportionate earthquake damage. A building assigned to Seismic Design Category D, E or F that has sustained *disproportionate earthquake damage* shall be subject to the requirements for buildings with *substantial structural damage* to vertical elements of the lateral force-resisting system.

[BS] 502.3 Flood hazard areas. For buildings and structures in *flood hazard* areas established in Section 1612.3 of the *International Building Code*, or Section R322 of the *International Residential Code*, as applicable, any *addition* that constitutes *substantial improvement* of the *existing structure* shall comply with the flood design requirements for new construction, and all aspects of the *existing structure* shall be brought into compliance with the requirements for new construction for flood design.

For buildings and structures in *flood hazard areas* established in Section 1612.3 of the *International Building Code*, or Section R322 of the *International Residential Code*, as applicable, any *additions* that do not constitute *substantial improvement* of the *existing structure* are not required to comply with the flood design requirements for new construction.

[BS] 502.4 Existing structural elements carrying gravity load. Any existing gravity load-carrying structural element for which an *addition* and its related *alterations* cause an increase in design dead, live or snow load, including snow drift effects, of more than 5 percent shall be replaced or altered as needed to carry the gravity loads required by the *International Building Code* for new structures. Any existing gravity load-carrying structural element whose vertical load-carrying capacity is decreased as part of the *addition* and its related *alterations* shall be considered to be an altered element subject to the requirements of Section 503.3. Any existing element that will form part of the lateral load path for any part of the *addition* shall be considered to be an existing lateral load-carrying structural element subject to the requirements of Section 502.5.

Exception: Buildings of Group R occupancy with not more than five dwelling or sleeping units used solely for residential purposes where the *existing building* and the *addition* together comply with the conventional light-frame construction methods of the *International Building*

Code or the provisions of the *International Residential Code*.

[BS] 502.5 Existing structural elements carrying lateral load. Where the *addition* is structurally independent of the *existing structure*, existing lateral load-carrying structural elements shall be permitted to remain unaltered. Where the *addition* is not structurally independent of the *existing structure*, the *existing structure* and its *addition* acting together as a single structure shall be shown to meet the requirements of Sections 1609 and 1613 of the *International Building Code* using full seismic forces.

Exceptions:

1. Any existing lateral load-carrying structural element whose demand-capacity ratio with the *addition* considered is not more than 10 percent greater than its demand-capacity ratio with the *addition* ignored shall be permitted to remain unaltered. For purposes of calculating demand-capacity ratios, the demand shall consider applicable load combinations with design lateral loads or forces in accordance with Sections 1609 and 1613 of the *International Building Code*. For purposes of this exception, comparisons of demand-capacity ratios and calculation of design lateral loads, forces and capacities shall account for the cumulative effects of *additions* and *alterations* since original construction.
2. Buildings of Group R occupancy with not more than five dwelling or sleeping units used solely for residential purposes where the *existing building* and the *addition* together comply with the conventional light-frame construction methods of the *International Building Code* or the provisions of the *International Residential Code*.

* **502.6 Enhanced classroom acoustics.** In Group E occupancies, enhanced classroom acoustics shall be provided in all classrooms in the *addition* with a volume of 20,000 cubic feet (565 m^3) or less. Enhanced classroom acoustics shall comply with the reverberation time in Section 808 of ICC A117.1. *

SECTION 503
ALTERATIONS

503.1 General. *Alterations* to any building or structure shall comply with the requirements of the *International Building Code* for new construction. *Alterations* shall be such that the *existing building* or structure is not less complying with the provisions of the *International Building Code* than the *existing building* or structure was prior to the *alteration*.

Exceptions:

1. An existing stairway shall not be required to comply with the requirements of Section 1011 of the *International Building Code* where the existing space and construction does not allow a reduction in pitch or slope.
2. Handrails otherwise required to comply with Section 1011.11 of the *International Building Code* shall not be required to comply with the requirements of Section 1014.6 of the *International Building Code* regarding full extension of the handrails where such extensions would be hazardous because of plan configuration.
3. Where provided in below-grade transportation stations, existing and new escalators shall be permitted to have a clear width of less than 32 inches (815 mm).

[BS] 503.2 Flood hazard areas. For buildings and structures in *flood hazard areas* established in Section 1612.3 of the *International Building Code*, or Section R322 of the *International Residential Code*, as applicable, any *alteration* that constitutes *substantial improvement* of the *existing structure* shall comply with the flood design requirements for new construction, and all aspects of the *existing structure* shall be brought into compliance with the requirements for new construction for flood design.

For buildings and structures in *flood hazard areas* established in Section 1612.3 of the *International Building Code*, or Section R322 of the *International Residential Code*, as applicable, any *alterations* that do not constitute *substantial improvement* of the *existing structure* are not required to comply with the flood design requirements for new construction.

[BS] 503.3 Existing structural elements carrying gravity load. Any existing gravity load-carrying structural element for which an *alteration* causes an increase in design dead, live or snow load, including snow drift effects, of more than 5 percent shall be replaced or altered as needed to carry the gravity loads required by the *International Building Code* for new structures. Any existing gravity load-carrying structural element whose gravity load-carrying capacity is decreased as part of the *alteration* shall be shown to have the capacity to resist the applicable design dead, live and snow loads including snow drift effects required by the *International Building Code* for new structures.

Exceptions:

1. Buildings of Group R occupancy with not more than five dwelling or sleeping units used solely for residential purposes where the altered building complies with the conventional light-frame construction methods of the *International Building Code* or the provisions of the *International Residential Code*.
2. Buildings in which the increased dead load is due entirely to the addition of a second layer of roof covering weighing 3 pounds per square foot (0.1437 kN/m^2) or less over an existing single layer of roof covering.

[BS] 503.4 Existing structural elements carrying lateral load. Except as permitted by Section 503.13, where the *alteration* increases design lateral loads, results in a prohibited structural irregularity as defined in ASCE 7, or decreases the capacity of any existing lateral load-carrying

structural element, the structure of the altered building or structure shall meet the requirements of Sections 1609 and 1613 of the *International Building Code*. Reduced seismic forces shall be permitted.

Exceptions:

1. Any existing lateral load-carrying structural element whose demand-capacity ratio with the alteration considered is not more than 10 percent greater than its demand-capacity ratio with the alteration ignored shall be permitted to remain unaltered. For purposes of calculating demand-capacity ratios, the demand shall consider applicable load combinations with design lateral loads or forces in accordance with Sections 1609 and 1613 of the *International Building Code*. Reduced seismic forces shall be permitted. For purposes of this exception, comparisons of demand-capacity ratios and calculation of design lateral loads, forces and capacities shall account for the cumulative effects of additions and alterations since original construction.
2. Buildings in which the increase in the demand-capacity ratio is due entirely to the addition of rooftop-supported mechanical equipment individually having an operating weight less than 400 pounds (181.4 kg) and where the total additional weight of all rooftop equipment placed after initial construction of the building is less than 10 percent of the roof dead load. For purposes of this exception, "roof" shall mean the roof level above a particular story.

[BS] 503.5 Seismic Design Category F. Where the *work area* exceeds 50 percent of the building area, and where the building is assigned to Seismic Design Category F, the structure of the altered building shall meet the requirements of Sections 1609 and 1613 of the *International Building Code*. Reduced seismic forces shall be permitted.

[BS] 503.6 Bracing for unreinforced masonry parapets on reroofing. Where the intended *alteration* requires a permit for reroofing and involves removal of roofing materials from more than 25 percent of the roof area of a building assigned to Seismic Design Category D, E or F that has parapets constructed of unreinforced masonry, the work shall include installation of parapet bracing to resist out-of-plane seismic forces, unless an evaluation demonstrates compliance of such items. Reduced seismic forces shall be permitted.

[BS] 503.7 Anchorage for concrete and reinforced masonry walls. Where the *work area* exceeds 50 percent of the building area, the building is assigned to Seismic Design Category C, D, E or F and the building's structural system includes concrete or reinforced masonry walls with a flexible roof diaphragm, the *alteration* work shall include installation of wall anchors at the roof line, unless an evaluation demonstrates compliance of existing wall anchorage. Use of reduced seismic forces shall be permitted.

[BS] 503.8 Anchorage for unreinforced masonry walls in major alterations. Where the *work area* exceeds 50 percent of the building area, the building is assigned to Seismic Design Category C, D, E or F and the building's structural system includes unreinforced masonry bearing walls, the *alteration* work shall include installation of wall anchors at the floor and roof lines, unless an evaluation demonstrates compliance of existing wall anchorage. Reduced seismic forces shall be permitted.

[BS] 503.9 Bracing for unreinforced masonry parapets in major alterations. Where the *work area* exceeds 50 percent of the building area, and where the building is assigned to Seismic Design Category C, D, E or F, parapets constructed of unreinforced masonry shall have bracing installed as needed to resist out-of-plane seismic forces, unless an evaluation demonstrates compliance of such items. Reduced seismic forces shall be permitted.

[BS] 503.10 Anchorage of unreinforced masonry partitions in major alterations. Where the *work area* exceeds 50 percent of the building area, and where the building is assigned to Seismic Design Category C, D, E or F, unreinforced masonry partitions and nonstructural walls within the *work area* and adjacent to egress paths from the *work area* shall be anchored, removed or altered to resist out-of-plane seismic forces, unless an evaluation demonstrates compliance of such items. Use of reduced seismic forces shall be permitted.

[BS] 503.11 Substantial structural alteration. Where the *work area* exceeds 50 percent of the building area and where work involves a *substantial structural alteration*, the lateral load-resisting system of the altered building shall satisfy the requirements of Sections 1609 and 1613 of the *International Building Code*. Reduced seismic forces shall be permitted.

Exceptions:

1. Buildings of Group R occupancy with not more than five dwelling or sleeping units used solely for residential purposes that are altered based on the conventional light-frame construction methods of the *International Building Code* or in compliance with the provisions of the *International Residential Code*.
2. Where the intended *alteration* involves only the lowest story of a building, only the lateral load-resisting components in and below that story need comply with this section.

[BS] 503.12 Roof diaphragms resisting wind loads in high-wind regions. Where the intended *alteration* requires a permit for reroofing and involves removal of roofing materials from more than 50 percent of the roof diaphragm of a building or section of a building located where the ultimate design wind speed is greater than 130 mph (58 m/s) in accordance with Figure 1609.3(1) of the *International Building Code*, roof diaphragms, connections of the roof diaphragm to roof framing members, and roof-to-wall connections shall be evaluated for the wind loads specified in Section 1609 of the *International Building Code*, including wind uplift. If the diaphragms and connections in their current condition are not capable of resisting 75 percent of those wind loads, they shall be replaced or strengthened in accordance with the

COMMUNITY DEVELOPMENT SERVICES
Building Partnerships — Building Communities

411 N Ruby Street, Suite 2
Ellensburg, WA 98926
cds@co.kittitas.wa.us
509-962-7506

CLIMATIC AND GEOGRAPHIC DESIGN CRITERIA

Recipient: **Andrew McEachern**

Date: **06/05/2024** Tax ID: **17-19-11058-0024**

Parcel Number: **072533**

Site Address: **S MAIN ST KITTITAS, KITTITAS, WA 98926-8798**

2018 IRC Table R301.2(1) (See KCC SECTION 14.04.020 for footnotes)

GROUND SNOW LOAD	WIND SPEED[d] (mph)	SEISMIC DESIGN CATEGORY[f]	WEATHERING[a]	FROST LINE DEPTH[b]	TERMITE[c]	WINTER DESIGN TEMP[e]	ICE BARRIER UNDERLAYMENT REQUIRED[h]	FLOOD HAZARDS[g]	AIR FREEZING INDEX[i]	MEAN ANNUAL TEMP[j]
Min. 30 psf Roof	110	C, D0 & D1 are present	Severe	24"	Slight to Moderate	2°F	Yes	A through C	1,000 – 2,000	50°F

Snow Load Information

Roof Snow Load Formula: (**PF**) = (0.7)(**CE**)(**CT**)(**I**)(**PG**)

1638 ELEVATION

X **0.02** ISO

0.7	1	1.1 Heated / 1.2 Unheated	1	33 psf	=	30 psf For Heated Structures / 30 psf For Unheated Structures
COEFF	(CE) EXPOSURE FACTOR	(CT) THERMAL FACTOR	(I) IMPORTANCE FACTOR	(PG) GROUND SNOW LOAD		(PF) **ROOF SNOW LOAD**

ALSO, See ASCE 7.10 for other snow load issues

Section 7.4 Pitch Reduction. Do not reduce where snow cannot slide off roof. (Valley, Pitch Breaks, etc)

Section 7.6 Unbalanced Roof Snow Loads.

Section 7.7 Drifts on Lower Roofs/ Decks.

Section 7.9 Sliding Snow ON Lower Roofs/Decks.

See 2018 Washington State Energy Code Climate Zone 5 (see http://www.energy.wsu.edu)

Other Design Criteria

Building Code: 2021 IBC & 2021 IRC

Wind Speed: 110 MPH

Exposure: ☐ B ☐ C

Prescriptive IRC

Seismic Zone: **C**

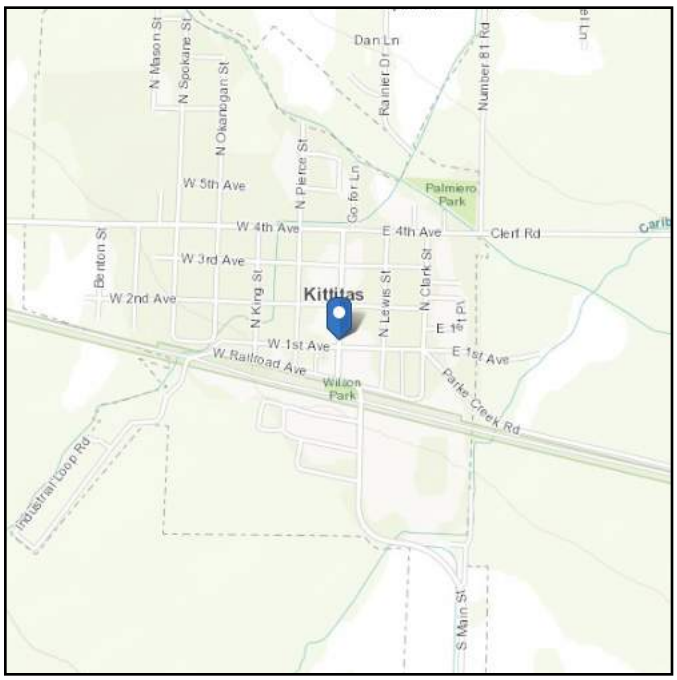
Roof Class: **CLASS C**

Frost Depth: 24 inches

ASCE Hazards Report

Address:
98934
Kittitas, Washington

Standard:	ASCE/SEI 7-16	**Latitude:**	46.983375
Risk Category:	II	**Longitude:**	-120.417609
Soil Class:	D - Default (see Section 11.4.3)	**Elevation:**	1652.5167958956276 ft (NAVD 88)



Wind

Results:

Wind Speed	99 Vmph
10-year MRI	69 Vmph
25-year MRI	75 Vmph
50-year MRI	80 Vmph
100-year MRI	85 Vmph

Data Source:	ASCE/SEI 7-16, Fig. 26.5-1B and Figs. CC.2-1–CC.2-4, and Section 26.5.2
Date Accessed:	Wed Jun 05 2024

Value provided is 3-second gust wind speeds at 33 ft above ground for Exposure C Category, based on linear interpolation between contours. Wind speeds are interpolated in accordance with the 7-16 Standard. Wind speeds correspond to approximately a 7% probability of exceedance in 50 years (annual exceedance probability = 0.00143, MRI = 700 years).

Site is not in a hurricane-prone region as defined in ASCE/SEI 7-16 Section 26.2.

Seismic

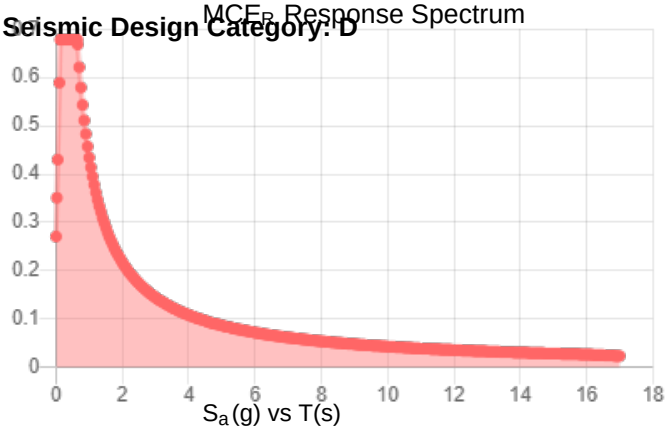
Site Soil Class: D - Default (see Section 11.4.3)

Results:

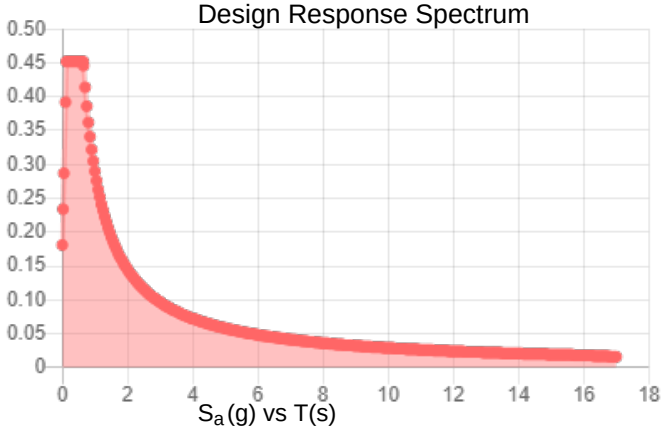
S_S :	0.478	S_{D1} :	0.29
S_1 :	0.197	T_L :	16
F_a :	1.417	PGA :	0.211
F_v :	2.206	PGA_M :	0.293
S_{MS} :	0.678	F_{PGA} :	1.389
S_{M1} :	0.434	I_e :	1
S_{DS} :	0.452	C_v :	1.019

Seismic Design Category: D

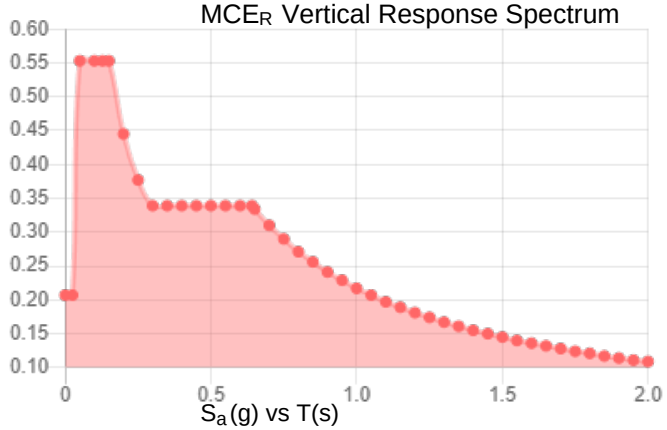
MCE_R Response Spectrum



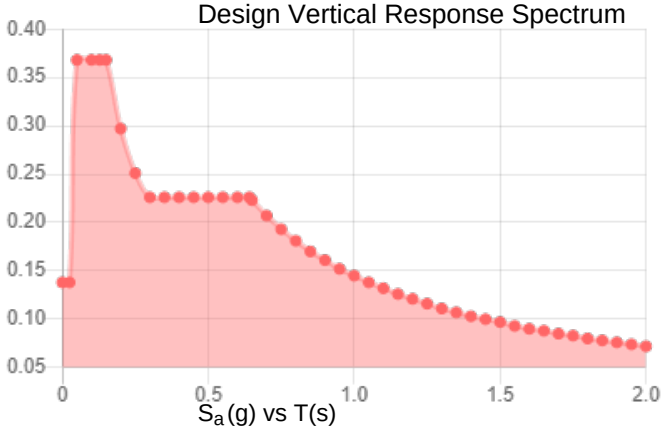
Design Response Spectrum



MCE_R Vertical Response Spectrum



Design Vertical Response Spectrum



Data Accessed: **Wed Jun 05 2024**

Date Source:

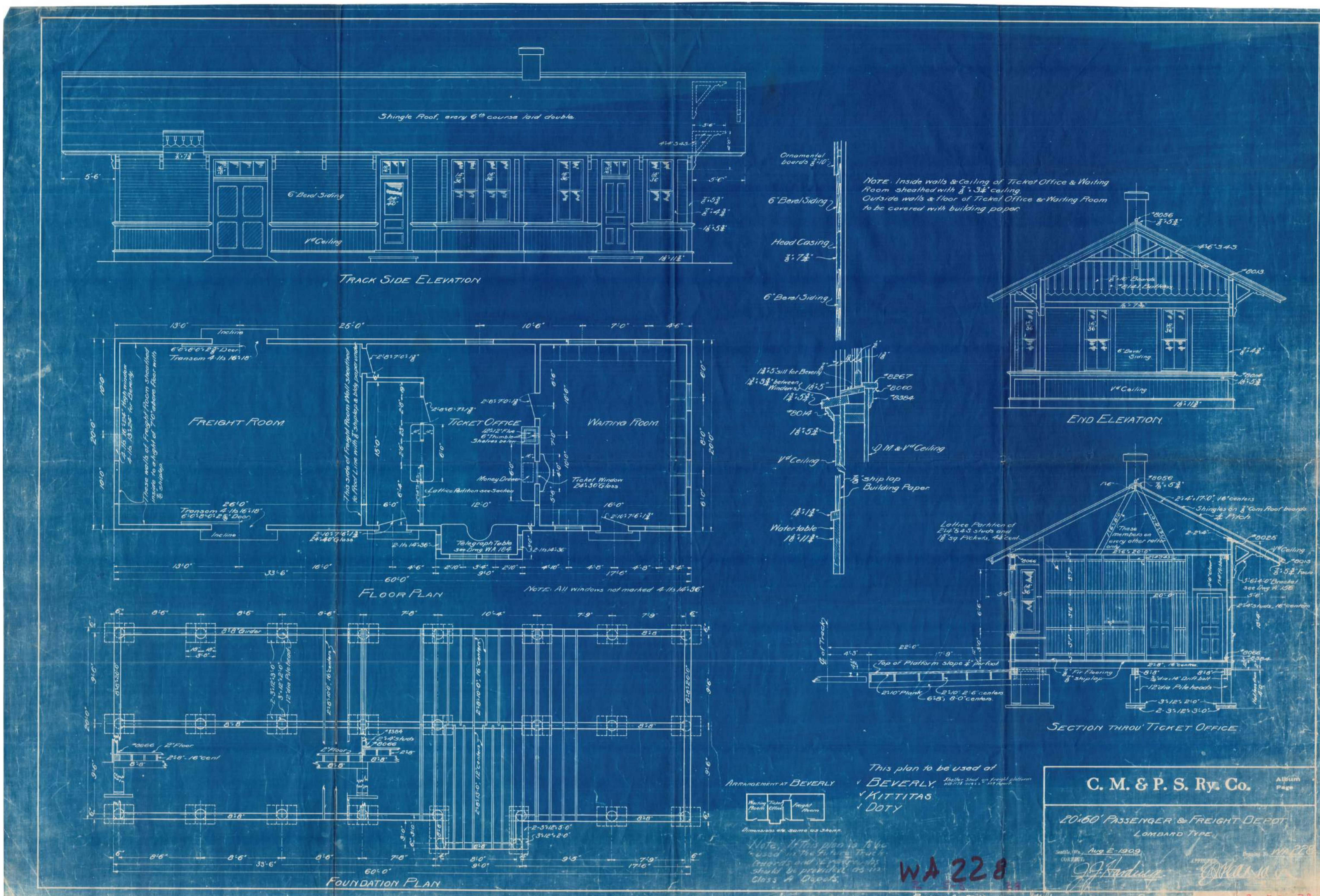
USGS Seismic Design Maps based on ASCE/SEI 7-16 and ASCE/SEI 7-16 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-16 Ch. 21 are available from USGS.

The ASCE Hazard Tool is provided for your convenience, for informational purposes only, and is provided “as is” and without warranties of any kind. The location data included herein has been obtained from information developed, produced, and maintained by third party providers; or has been extrapolated from maps incorporated in the ASCE standard. While ASCE has made every effort to use data obtained from reliable sources or methodologies, ASCE does not make any representations or warranties as to the accuracy, completeness, reliability, currency, or quality of any data provided herein. Any third-party links provided by this Tool should not be construed as an endorsement, affiliation, relationship, or sponsorship of such third-party content by or from ASCE.

ASCE does not intend, nor should anyone interpret, the results provided by this Tool to replace the sound judgment of a competent professional, having knowledge and experience in the appropriate field(s) of practice, nor to substitute for the standard of care required of such professionals in interpreting and applying the contents of this Tool or the ASCE standard.

In using this Tool, you expressly assume all risks associated with your use. Under no circumstances shall ASCE or its officers, directors, employees, members, affiliates, or agents be liable to you or any other person for any direct, indirect, special, incidental, or consequential damages arising from or related to your use of, or reliance on, the Tool or any information obtained therein. To the fullest extent permitted by law, you agree to release and hold harmless ASCE from any and all liability of any nature arising out of or resulting from any use of data provided by the ASCE Hazard Tool.

ORIGINAL RECORD DRAWINGS



Shingle Roof, every 6th course laid double.
6" Bevel Siding
V'd Ceiling
TRACK SIDE ELEVATION
FREIGHT ROOM
TICKET OFFICE
WAITING ROOM
Incline
Telegraph Table see Drwg WA 184
Ticket Window 24×30 Glass
Money Drawer
Lattice Partition see Section
FLOOR PLAN
NOTE: All windows not marked 4-lts 16×36"
8×8 Girder
12" dia Pile heads
FOUNDATION PLAN
NOTE: Inside walls & Ceiling of Ticket Office & Waiting Room sheathed with 7/8" × 3¼" ceiling. Outside walls & floor of Ticket Office & Waiting Room to be covered with building paper.
Ornamental boards
Head Casing
Water table
Building Paper
END ELEVATION
SECTION THROU' TICKET OFFICE
Top of Platform slope ¼" per foot
Shingles on 7/8" Com. Roof boards ¼ Pitch
ARRANGEMENT AT BEVERLY
Waiting Room
Ticket Office
Freight Room
Dimensions etc. same as shown.
This plan to be used at
BEVERLY,
KITTITAS
DOTY
C. M. & P. S. Ry. Co.
20×60' PASSENGER & FREIGHT DEPOT
LOMBARD TYPE.
Aug 2-1909
WA 228

STRUCTURAL CALCULATIONS

Section 1809.5 shall be satisfied. The minimum width of footings shall be 12 inches (305 mm).

1809.5 Frost protection. Except where otherwise protected from frost, foundations and other permanent supports of buildings and structures shall be protected from frost by one or more of the following methods:

1. Extending below the frost line of the locality.
2. Constructing in accordance with ASCE 32.
3. Erecting on solid rock.

Exception: Free-standing buildings meeting all of the following conditions shall not be required to be protected:

1. Assigned to *Risk Category* I.
2. Area of 600 square feet (56 m^2) or less for *light-frame construction* or 400 square feet (37 m^2) or less for other than *light-frame construction*.
3. Eave height of 10 feet (3048 mm) or less.

Shallow foundations shall not bear on frozen soil unless such frozen condition is of a permanent character.

1809.5.1 Frost protection at required exits. Frost protection shall be provided at exterior landings for all required exits with outward-swinging doors. Frost protection shall only be required to the extent necessary to ensure the unobstructed opening of the required *exit* doors.

1809.6 Location of footings. Footings on granular soil shall be so located that the line drawn between the lower edges of adjoining footings shall not have a slope steeper than 30 degrees (0.52 rad) with the horizontal, unless the material supporting the higher footing is braced or retained or otherwise laterally supported in an *approved* manner or a greater slope has been properly established by engineering analysis.

1809.7 Prescriptive footings for light-frame construction. Where a specific design is not provided, concrete or masonry-unit footings supporting walls of *light-frame construction* shall be permitted to be designed in accordance with Table 1809.7.

1809.8 Plain concrete footings. The edge thickness of plain concrete footings supporting walls of other than *light-frame construction* shall be not less than 8 inches (203 mm) where placed on soil or rock.

Exception: For plain concrete footings supporting Group R-3 occupancies, the edge thickness is permitted to be 6 inches (152 mm), provided that the footing does not extend beyond a distance greater than the thickness of the footing on either side of the supported wall.

1809.9 Masonry-unit footings. The design, materials and construction of masonry-unit footings shall comply with Sections 1809.9.1 and 1809.9.2, and the provisions of Chapter 21.

Exception: Where a specific design is not provided, masonry-unit footings supporting walls of *light-frame construction* shall be permitted to be designed in accordance with Table 1809.7.

1809.9.1 Dimensions. Masonry-unit footings shall be laid in Type M or S *mortar* complying with Section 2103.2.1 and the depth shall be not less than twice the projection beyond the wall, pier or column. The width shall be not less than 8 inches (203 mm) wider than the wall supported thereon.

1809.9.2 Offsets. The maximum offset of each course in brick foundation walls stepped up from the footings shall be $1^1/_2$ inches (38 mm) where laid in single courses, and 3 inches (76 mm) where laid in double courses.

1809.10 Pier and curtain wall foundations. Except in *Seismic Design Categories* D, E and F, pier and curtain wall foundations shall be permitted to be used to support *light-frame construction* not more than two *stories above grade plane*, provided that the following requirements are met:

1. All *load-bearing walls* shall be placed on continuous concrete footings bonded integrally with the *exterior wall* footings.
2. The minimum actual thickness of a load-bearing masonry wall shall be not less than 4 inches (102 mm) nominal or $3^5/_8$ inches (92 mm) actual thickness, and shall be bonded integrally with piers spaced 6 feet (1829 mm) on center (o.c.).
3. Piers shall be constructed in accordance with Chapter 21 and the following:
   - 3.1. The unsupported height of the masonry piers shall not exceed 10 times their least dimension.
   - 3.2. Where *structural clay tile* or hollow concrete *masonry units* are used for piers supporting beams and girders, the cellular

TABLE 1809.7
PRESCRIPTIVE FOOTINGS SUPPORTING WALLS OF LIGHT-FRAME CONSTRUCTION[a, b, c, d, e]

NUMBER OF FLOORS SUPPORTED BY THE FOOTING[f]	WIDTH OF FOOTING (inches)	THICKNESS OF FOOTING (inches)
1	12	6
2	15	6
3	18	8[g]

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

a. Depth of footings shall be in accordance with Section 1809.4.
b. The ground under the floor shall be permitted to be excavated to the elevation of the top of the footing.
c. Interior stud-bearing walls shall be permitted to be supported by isolated footings. The footing width and length shall be twice the width shown in this table, and footings shall be spaced not more than 6 feet on center.
d. See Section 1905 for additional requirements for concrete footings of structures assigned to Seismic Design Category C, D, E or F.
e. For thickness of foundation walls, see Section 1807.1.6.
f. Footings shall be permitted to support a roof in addition to the stipulated number of floors. Footings supporting roof only shall be as required for supporting one floor.
g. Plain concrete footings for Group R-3 occupancies shall be permitted to be 6 inches thick.

AHBL Engineers
2215 North 30th Street
Suite 300
Tacoma, WA 98403
253.383.2422

Project Title: Kittitas Historic Depot
Engineer: ADM
Project ID: 2230784.20
Project Descr: Improvements to Existing Depot Building

General Footing

Project File: 2230784.ec6

DESCRIPTION: Interior Spread Footing

Code References

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combinations Used : IBC 2021

General Information

Material Properties

f'c : Concrete 28 day strength	=	2.50	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.	=	0.00180
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	=	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

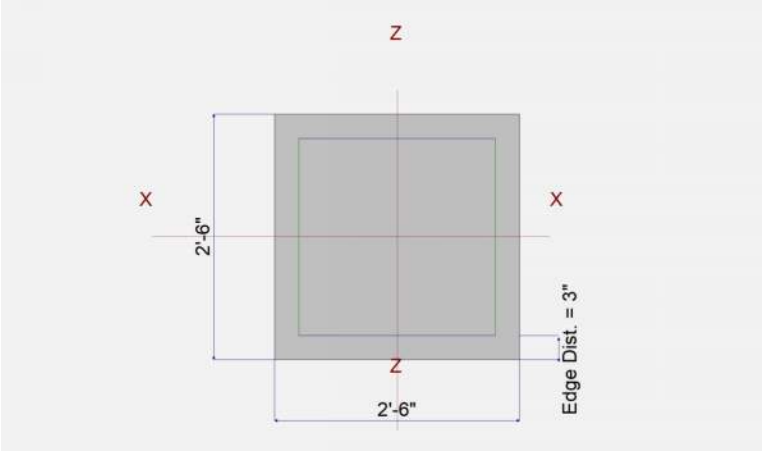
Width parallel to X-X Axis	=	2.50 ft
Length parallel to Z-Z Axis	=	2.50 ft
Footing Thickness	=	7.0 in

Pedestal dimensions...

px : parallel to X-X Axis	=	8.0 in
pz : parallel to Z-Z Axis	=	8.0 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	=		2.0
Reinforcing Bar Size	=	#	4
Bars parallel to Z-Z Axis			
Number of Bars	=		2.0
Reinforcing Bar Size	=	#	4

Bandwidth Distribution Check (ACI 15.4.4.2)

Direction Requiring Closer Separation	n/a
# Bars required within zone	n/a
# Bars required on each side of zone	n/a

Applied Loads

		D	Lr	L	S	W	E	H	
P : Column Load	=	2.0		4.0					k
OB : Overburden	=								ksf
M-xx	=								k-ft
M-zz	=								k-ft
V-x	=								k
V-z	=								k

AHBL Engineers
2215 North 30th Street
Suite 300
Tacoma, WA 98403
253.383.2422

Project Title: Kittitas Historic Depot
Engineer: ADM
Project ID: 2230784.20
Project Descr: Improvements to Existing Depot Building

General Footing

Project File: 2230784.ec6

DESCRIPTION: Interior Spread Footing

DESIGN SUMMARY

Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.6967	Soil Bearing	1.045 ksf	1.50 ksf	+D+L about Z-Z axis
PASS	n/a	Overturning - X-X	0.0 k-ft	0.0 k-ft	No Overturning
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	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	0.2155	Z Flexure (+X)	0.5915 k-ft/ft	2.744 k-ft/ft	+1.20D+1.60L
PASS	0.2155	Z Flexure (-X)	0.5915 k-ft/ft	2.744 k-ft/ft	+1.20D+1.60L
PASS	0.2155	X Flexure (+Z)	0.5915 k-ft/ft	2.744 k-ft/ft	+1.20D+1.60L
PASS	0.2155	X Flexure (-Z)	0.5915 k-ft/ft	2.744 k-ft/ft	+1.20D+1.60L
PASS	0.2249	1-way Shear (+X)	16.867 psi	75.0 psi	+1.20D+1.60L
PASS	0.2249	1-way Shear (-X)	16.867 psi	75.0 psi	+1.20D+1.60L
PASS	0.2249	1-way Shear (+Z)	16.867 psi	75.0 psi	+1.20D+1.60L
PASS	0.2249	1-way Shear (-Z)	16.867 psi	75.0 psi	+1.20D+1.60L
PASS	0.2567	2-way Punching	38.50 psi	150.0 psi	+1.20D+1.60L

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	0.4046	0.4046	n/a	n/a	0.270
X-X, +D+L	1.50	n/a	0.0	1.045	1.045	n/a	n/a	0.697
X-X, +D+0.750L	1.50	n/a	0.0	0.8846	0.8846	n/a	n/a	0.590
X-X, +0.60D	1.50	n/a	0.0	0.2428	0.2428	n/a	n/a	0.162
Z-Z, D Only	1.50	0.0	n/a	n/a	n/a	0.4046	0.4046	0.270
Z-Z, +D+L	1.50	0.0	n/a	n/a	n/a	1.045	1.045	0.697
Z-Z, +D+0.750L	1.50	0.0	n/a	n/a	n/a	0.8846	0.8846	0.590
Z-Z, +0.60D	1.50	0.0	n/a	n/a	n/a	0.2428	0.2428	0.162

Overturning Stability

Rotation Axis & Load Combination...	Overturning Moment	Resisting Moment	Stability Ratio	Status
Footing Has NO Overturning				

Sliding Stability

All units k

Force Application Axis Load Combination...	Sliding Force	Resisting Force	Stability Ratio	Status
Footing Has NO Sliding				

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Side	Tension Surface	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
X-X, +1.40D	0.1882	+Z	Bottom	0.1512	ACI 7.6.1.1	0.160	2.744	OK
X-X, +1.40D	0.1882	-Z	Bottom	0.1512	ACI 7.6.1.1	0.160	2.744	OK
X-X, +1.20D+1.60L	0.5915	+Z	Bottom	0.1512	ACI 7.6.1.1	0.160	2.744	OK
X-X, +1.20D+1.60L	0.5915	-Z	Bottom	0.1512	ACI 7.6.1.1	0.160	2.744	OK
X-X, +1.20D+0.50L	0.2958	+Z	Bottom	0.1512	ACI 7.6.1.1	0.160	2.744	OK
X-X, +1.20D+0.50L	0.2958	-Z	Bottom	0.1512	ACI 7.6.1.1	0.160	2.744	OK
X-X, +1.20D	0.1613	+Z	Bottom	0.1512	ACI 7.6.1.1	0.160	2.744	OK
X-X, +1.20D	0.1613	-Z	Bottom	0.1512	ACI 7.6.1.1	0.160	2.744	OK
X-X, +0.90D	0.1210	+Z	Bottom	0.1512	ACI 7.6.1.1	0.160	2.744	OK
X-X, +0.90D	0.1210	-Z	Bottom	0.1512	ACI 7.6.1.1	0.160	2.744	OK
Z-Z, +1.40D	0.1882	-X	Bottom	0.1512	ACI 7.6.1.1	0.160	2.744	OK
Z-Z, +1.40D	0.1882	+X	Bottom	0.1512	ACI 7.6.1.1	0.160	2.744	OK
Z-Z, +1.20D+1.60L	0.5915	-X	Bottom	0.1512	ACI 7.6.1.1	0.160	2.744	OK
Z-Z, +1.20D+1.60L	0.5915	+X	Bottom	0.1512	ACI 7.6.1.1	0.160	2.744	OK
Z-Z, +1.20D+0.50L	0.2958	-X	Bottom	0.1512	ACI 7.6.1.1	0.160	2.744	OK
Z-Z, +1.20D+0.50L	0.2958	+X	Bottom	0.1512	ACI 7.6.1.1	0.160	2.744	OK
Z-Z, +1.20D	0.1613	-X	Bottom	0.1512	ACI 7.6.1.1	0.160	2.744	OK

AHBL Engineers
2215 North 30th Street
Suite 300
Tacoma, WA 98403
253.383.2422

Project Title: Kittitas Historic Depot
Engineer: ADM
Project ID: 2230784.20
Project Descr: Improvements to Existing Depot Building

General Footing

Project File: 2230784.ec6

DESCRIPTION: Interior Spread Footing

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Side	Tension Surface	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
Z-Z, +1.20D	0.1613	+X	Bottom	0.1512	ACI 7.6.1.1	0.160	2.744	OK
Z-Z, +0.90D	0.1210	-X	Bottom	0.1512	ACI 7.6.1.1	0.160	2.744	OK
Z-Z, +0.90D	0.1210	+X	Bottom	0.1512	ACI 7.6.1.1	0.160	2.744	OK

One Way Shear X

Load Combination...	Vu @ -X	Vu @ +X	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	5.37 psi	5.37 psi	5.37 psi	75.00 psi	0.07	OK
+1.20D+1.60L	16.87 psi	16.87 psi	16.87 psi	75.00 psi	0.22	OK
+1.20D+0.50L	8.43 psi	8.43 psi	8.43 psi	75.00 psi	0.11	OK
+1.20D	4.60 psi	4.60 psi	4.60 psi	75.00 psi	0.06	OK
+0.90D	3.45 psi	3.45 psi	3.45 psi	75.00 psi	0.05	OK

One Way Shear Z

Load Combination...	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	5.37 psi	5.37 psi	5.37 psi	75.00 psi	0.07	OK
+1.20D+1.60L	16.87 psi	16.87 psi	16.87 psi	75.00 psi	0.22	OK
+1.20D+0.50L	8.43 psi	8.43 psi	8.43 psi	75.00 psi	0.11	OK
+1.20D	4.60 psi	4.60 psi	4.60 psi	75.00 psi	0.06	OK
+0.90D	3.45 psi	3.45 psi	3.45 psi	75.00 psi	0.05	OK

Two-Way "Punching" Shear

All units k

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	12.25 psi	150.00 psi	0.08167	OK
+1.20D+1.60L	38.50 psi	150.00 psi	0.2567	OK
+1.20D+0.50L	19.25 psi	150.00 psi	0.1283	OK
+1.20D	10.50 psi	150.00 psi	0.07	OK
+0.90D	7.88 psi	150.00 psi	0.0525	OK

AHBL Engineers
2215 North 30th Street
Suite 300
Tacoma, WA 98403
253.383.2422

Project Title: Kittitas Historic Depot
Engineer: ADM
Project ID: 2230784.20
Project Descr: Improvements to Existing Depot Building

General Footing

Project File: 2230784.ec6

DESCRIPTION: Interior Spread Footing at Mech Platform

Code References

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combinations Used : IBC 2021

General Information

Material Properties

f'c : Concrete 28 day strength	=	2.50	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.	=	0.00180
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	=	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

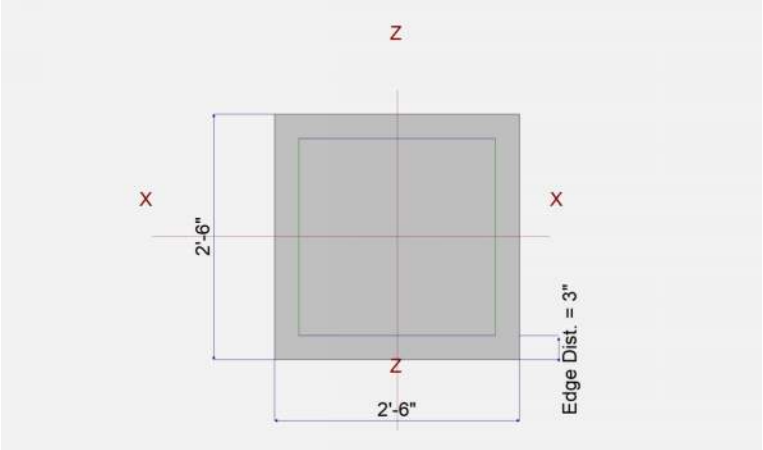
Width parallel to X-X Axis	=	2.50 ft
Length parallel to Z-Z Axis	=	2.50 ft
Footing Thickness	=	7.0 in

Pedestal dimensions...

px : parallel to X-X Axis	=	8.0 in
pz : parallel to Z-Z Axis	=	8.0 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	=		2.0
Reinforcing Bar Size	=	#	4
Bars parallel to Z-Z Axis			
Number of Bars	=		2.0
Reinforcing Bar Size	=	#	4

Bandwidth Distribution Check (ACI 15.4.4.2)

Direction Requiring Closer Separation	n/a
# Bars required within zone	n/a
# Bars required on each side of zone	n/a

Applied Loads

		D	Lr	L	S	W	E	H	
P : Column Load	=	2.60		6.0					k
OB : Overburden	=								ksf
M-xx	=								k-ft
M-zz	=								k-ft
V-x	=								k
V-z	=								k

AHBL Engineers
2215 North 30th Street
Suite 300
Tacoma, WA 98403
253.383.2422

Project Title: Kittitas Historic Depot
Engineer: ADM
Project ID: 2230784.20
Project Descr: Improvements to Existing Depot Building

General Footing

Project File: 2230784.ec6

DESCRIPTION: Interior Spread Footing at Mech Platform

DESIGN SUMMARY

Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.9740	Soil Bearing	1.461 ksf	1.50 ksf	+D+L about Z-Z axis
PASS	n/a	Overturning - X-X	0.0 k-ft	0.0 k-ft	No Overturning
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	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	0.3115	Z Flexure (+X)	0.8550 k-ft/ft	2.744 k-ft/ft	+1.20D+1.60L
PASS	0.3115	Z Flexure (-X)	0.8550 k-ft/ft	2.744 k-ft/ft	+1.20D+1.60L
PASS	0.3115	X Flexure (+Z)	0.8550 k-ft/ft	2.744 k-ft/ft	+1.20D+1.60L
PASS	0.3115	X Flexure (-Z)	0.8550 k-ft/ft	2.744 k-ft/ft	+1.20D+1.60L
PASS	0.3251	1-way Shear (+X)	24.380 psi	75.0 psi	+1.20D+1.60L
PASS	0.3251	1-way Shear (-X)	24.380 psi	75.0 psi	+1.20D+1.60L
PASS	0.3251	1-way Shear (+Z)	24.380 psi	75.0 psi	+1.20D+1.60L
PASS	0.3251	1-way Shear (-Z)	24.380 psi	75.0 psi	+1.20D+1.60L
PASS	0.3710	2-way Punching	55.650 psi	150.0 psi	+1.20D+1.60L

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	0.5006	0.5006	n/a	n/a	0.334
X-X, +D+L	1.50	n/a	0.0	1.461	1.461	n/a	n/a	0.974
X-X, +D+0.750L	1.50	n/a	0.0	1.221	1.221	n/a	n/a	0.814
X-X, +0.60D	1.50	n/a	0.0	0.3004	0.3004	n/a	n/a	0.200
Z-Z, D Only	1.50	0.0	n/a	n/a	n/a	0.5006	0.5006	0.334
Z-Z, +D+L	1.50	0.0	n/a	n/a	n/a	1.461	1.461	0.974
Z-Z, +D+0.750L	1.50	0.0	n/a	n/a	n/a	1.221	1.221	0.814
Z-Z, +0.60D	1.50	0.0	n/a	n/a	n/a	0.3004	0.3004	0.200

Overturning Stability

Rotation Axis & Load Combination...	Overturning Moment	Resisting Moment	Stability Ratio	Status
Footing Has NO Overturning				

Sliding Stability

All units k

Force Application Axis Load Combination...	Sliding Force	Resisting Force	Stability Ratio	Status
Footing Has NO Sliding				

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Side	Tension Surface	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
X-X, +1.40D	0.2447	+Z	Bottom	0.1512	ACI 7.6.1.1	0.160	2.744	OK
X-X, +1.40D	0.2447	-Z	Bottom	0.1512	ACI 7.6.1.1	0.160	2.744	OK
X-X, +1.20D+1.60L	0.8550	+Z	Bottom	0.1512	ACI 7.6.1.1	0.160	2.744	OK
X-X, +1.20D+1.60L	0.8550	-Z	Bottom	0.1512	ACI 7.6.1.1	0.160	2.744	OK
X-X, +1.20D+0.50L	0.4114	+Z	Bottom	0.1512	ACI 7.6.1.1	0.160	2.744	OK
X-X, +1.20D+0.50L	0.4114	-Z	Bottom	0.1512	ACI 7.6.1.1	0.160	2.744	OK
X-X, +1.20D	0.2097	+Z	Bottom	0.1512	ACI 7.6.1.1	0.160	2.744	OK
X-X, +1.20D	0.2097	-Z	Bottom	0.1512	ACI 7.6.1.1	0.160	2.744	OK
X-X, +0.90D	0.1573	+Z	Bottom	0.1512	ACI 7.6.1.1	0.160	2.744	OK
X-X, +0.90D	0.1573	-Z	Bottom	0.1512	ACI 7.6.1.1	0.160	2.744	OK
Z-Z, +1.40D	0.2447	-X	Bottom	0.1512	ACI 7.6.1.1	0.160	2.744	OK
Z-Z, +1.40D	0.2447	+X	Bottom	0.1512	ACI 7.6.1.1	0.160	2.744	OK
Z-Z, +1.20D+1.60L	0.8550	-X	Bottom	0.1512	ACI 7.6.1.1	0.160	2.744	OK
Z-Z, +1.20D+1.60L	0.8550	+X	Bottom	0.1512	ACI 7.6.1.1	0.160	2.744	OK
Z-Z, +1.20D+0.50L	0.4114	-X	Bottom	0.1512	ACI 7.6.1.1	0.160	2.744	OK
Z-Z, +1.20D+0.50L	0.4114	+X	Bottom	0.1512	ACI 7.6.1.1	0.160	2.744	OK
Z-Z, +1.20D	0.2097	-X	Bottom	0.1512	ACI 7.6.1.1	0.160	2.744	OK

AHBL Engineers
2215 North 30th Street
Suite 300
Tacoma, WA 98403
253.383.2422

Project Title: Kittitas Historic Depot
Engineer: ADM
Project ID: 2230784.20
Project Descr: Improvements to Existing Depot Building

General Footing

Project File: 2230784.ec6

DESCRIPTION: Interior Spread Footing at Mech Platform

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Side	Tension Surface	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
Z-Z, +1.20D	0.2097	+X	Bottom	0.1512	ACI 7.6.1.1	0.160	2.744	OK
Z-Z, +0.90D	0.1573	-X	Bottom	0.1512	ACI 7.6.1.1	0.160	2.744	OK
Z-Z, +0.90D	0.1573	+X	Bottom	0.1512	ACI 7.6.1.1	0.160	2.744	OK

One Way Shear X

Load Combination...	Vu @ -X	Vu @ +X	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	6.98 psi	6.98 psi	6.98 psi	75.00 psi	0.09	OK
+1.20D+1.60L	24.38 psi	24.38 psi	24.38 psi	75.00 psi	0.33	OK
+1.20D+0.50L	11.73 psi	11.73 psi	11.73 psi	75.00 psi	0.16	OK
+1.20D	5.98 psi	5.98 psi	5.98 psi	75.00 psi	0.08	OK
+0.90D	4.49 psi	4.49 psi	4.49 psi	75.00 psi	0.06	OK

One Way Shear Z

Load Combination...	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	6.98 psi	6.98 psi	6.98 psi	75.00 psi	0.09	OK
+1.20D+1.60L	24.38 psi	24.38 psi	24.38 psi	75.00 psi	0.33	OK
+1.20D+0.50L	11.73 psi	11.73 psi	11.73 psi	75.00 psi	0.16	OK
+1.20D	5.98 psi	5.98 psi	5.98 psi	75.00 psi	0.08	OK
+0.90D	4.49 psi	4.49 psi	4.49 psi	75.00 psi	0.06	OK

Two-Way "Punching" Shear

All units k

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	15.93 psi	150.00 psi	0.1062	OK
+1.20D+1.60L	55.65 psi	150.00 psi	0.371	OK
+1.20D+0.50L	26.78 psi	150.00 psi	0.1785	OK
+1.20D	13.65 psi	150.00 psi	0.091	OK
+0.90D	10.24 psi	150.00 psi	0.06825	OK

AHBL Engineers
2215 North 30th Street
Suite 300
Tacoma, WA 98403
253.383.2422

Project Title: Kittitas Historic Depot
Engineer: ADM
Project ID: 2230784.20
Project Descr: Improvements to Existing Depot Building

Wood Column

Project File: 2230784.ec6

DESCRIPTION: New Interior Crawlspace Post

Code References

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combinations Used : IBC 2021

General Information

Analysis Method	Allowable Stress Design		
End Fixities	Top & Bottom Pinned		
Overall Column Height	3 ft		
(Used for non-slender calculations)			
Wood Species	Douglas Fir-Larch		
Wood Grade	No.2		
Fb +	900 psi	Fv	180 psi
Fb -	900 psi	Ft	575 psi
Fc - Prll	1350 psi	Density	31.21 pcf
Fc - Perp	625 psi		

E : Modulus of Elasticity . . .	x-x Bending	y-y Bending	Axial
Basic	1600	1600	1600 ksi
Minimum	580	580	

Wood Section Name	**8x8**		
Wood Grading/Manuf.	Graded Lumber		
Wood Member Type	Sawn		
Exact Width	**7.50** in	Allow Stress Modification Factors	
Exact Depth	**7.50** in	Cf or Cv for Bending	1.0
Area	56.250 in^2	Cf or Cv for Compressio	1.0
Ix	263.672 in^4	Cf or Cv for Tension	1.0
Iy	263.672 in^4	Cm : Wet Use Factor	1.0
		Ct : Temperature Fact	1.0
		Cfu : Flat Use Factor	1.0
		Kf : Built-up columns	1.0
		Use Cr : Repetitive ?	No

Column Buckling Condition:
ABOUT X-X Axis: Lux = 3 ft, Kx = 1.0
ABOUT Y-Y Axis: Luy = 3 ft, Ky = 1.0

Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Column self weight included : 36.574 lbs * Dead Load Factor
AXIAL LOADS . . .
Floor Load: Axial Load at 3.0 ft, D = 2.0, L = 6.0 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.1073 : 1**

Load Combination	+D+L
Governing NDS Forumla	Comp Only, fc/Fc'
Location of max.above base	0.0 ft
At maximum location values are .	
Applied Axial	8.037 k
Applied Mx	0.0 k-ft
Applied My	0.0 k-ft
Fc : Allowable	1,331.68 psi

PASS Maximum Shear Stress Ratio = **0.0 : 1**

Load Combination	+0.60D
Location of max.above base	3.0 ft
Applied Design Shear	0.0 psi
Allowable Shear	288.0 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
Top along X-X	0.0 k	Bottom along X-X	0.0 k

Maximum SERVICE Load Lateral Deflections . . .

Along Y-Y 0.0 in at 0.0 ft above base
for load combination : n/a

Along X-X 0.0 in at 0.0 ft above base
for load combination : n/a

Other Factors used to calculate allowable stresses . . .

	Bending	Compression	Tension

Load Combination Results

Load Combination	C_D	C_P	Maximum Axial + Bending Stress Ratios: Stress Ratio	Status	Location	Maximum Shear Ratios: Stress Ratio	Status	Location
D Only	0.900	0.988	0.03017	PASS	0.0 ft	0.0	PASS	3.0 ft
+D+L	1.000	0.986	0.1073	PASS	0.0 ft	0.0	PASS	3.0 ft
+D+0.750L	1.250	0.983	0.07006	PASS	0.0 ft	0.0	PASS	3.0 ft
+0.60D	1.600	0.978	0.01029	PASS	0.0 ft	0.0	PASS	3.0 ft

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction k @ Base	@ Top	Y-Y Axis Reaction @ Base	@ Top	Axial Reaction @ Base	My - End Moments k-ft @ Base	@ Top	Mx - End Moments @ Base	@ Top
D Only					2.037				
+D+L					8.037				
+D+0.750L					6.537				

AHBL Engineers
2215 North 30th Street
Suite 300
Tacoma, WA 98403
253.383.2422

Project Title: Kittitas Historic Depot
Engineer: ADM
Project ID: 2230784.20
Project Descr: Improvements to Existing Depot Building

Wood Column

Project File: 2230784.ec6

DESCRIPTION: New Interior Crawlspace Post

Maximum Reactions

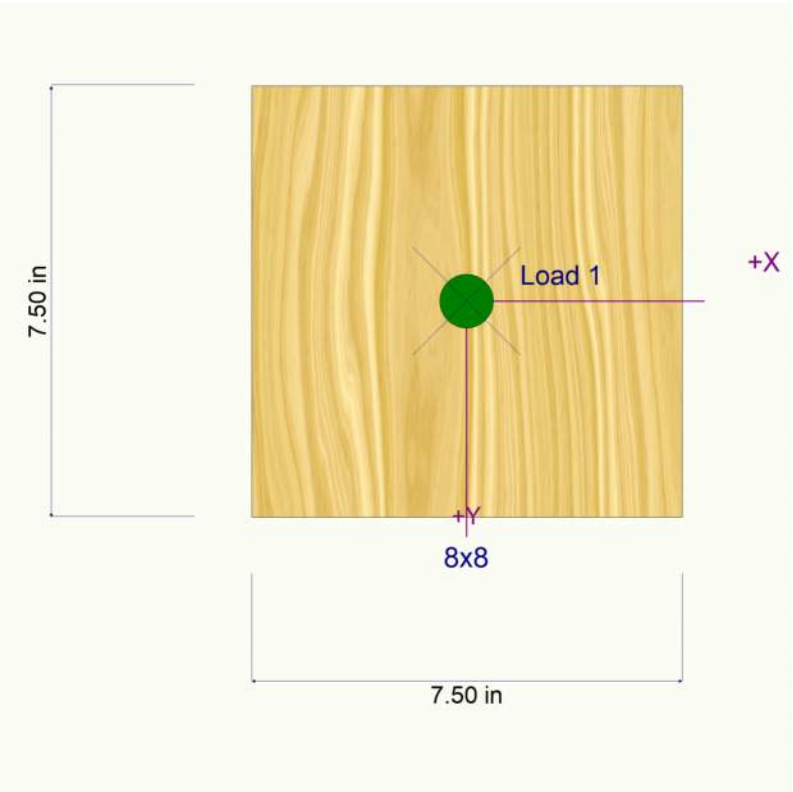
Note: Only non-zero reactions are listed.

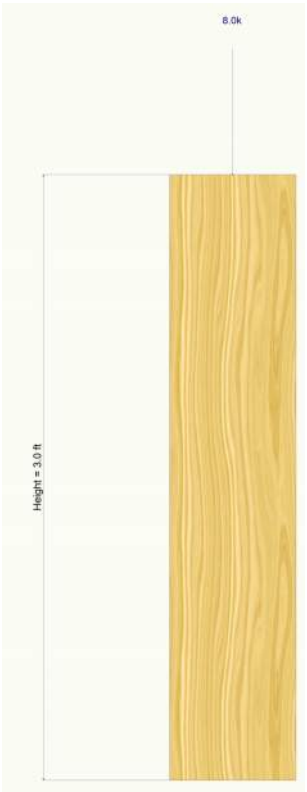
Load Combination	X-X Axis Reaction @ Base	@ Top	k	Y-Y Axis Reaction @ Base	@ Top	Axial Reaction @ Base	My - End Moments @ Base	@ Top	k-ft	Mx - End Moments @ Base	@ Top
+0.60D						1.222					
L Only						6.000					

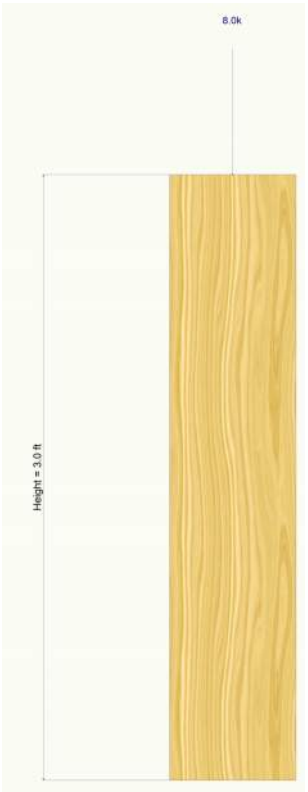
Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
D Only	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+L	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+0.750L	0.0000 in	0.000ft	0.000 in	0.000 ft
+0.60D	0.0000 in	0.000ft	0.000 in	0.000 ft
L Only	0.0000 in	0.000ft	0.000 in	0.000 ft

Sketches







AHBL Engineers
2215 North 30th Street
Suite 300
Tacoma, WA 98403
253.383.2422

Project Title: Kittitas Historic Depot
Engineer: ADM
Project ID: 2230784.20
Project Descr: Improvements to Existing Depot Building

Wood Beam

Project File: 2230784.ec6

DESCRIPTION: Existing Floor Joist - 10ft Span

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : IBC 2021

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : IBC 2021

Wood Species : Douglas Fir-Larch
Wood Grade : No.2

Beam Bracing : Beam bracing is defined as a set spacing over all spans

Fb +	900 psi
Fb -	900 psi
Fc - Prll	1350 psi
Fc - Perp	625 psi
Fv	180 psi
Ft	575 psi

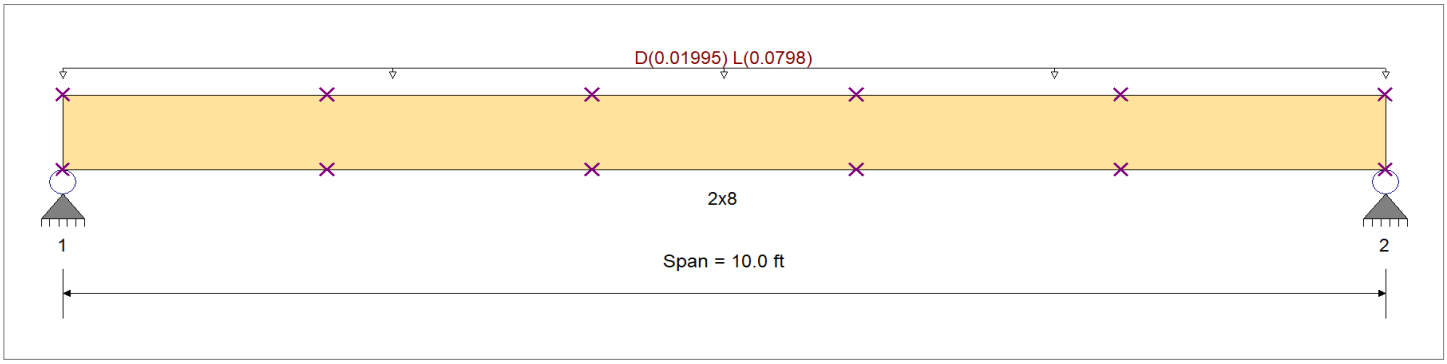
E : Modulus of Elasticity

Ebend- xx	1600 ksi
Eminbend - xx	580 ksi
Density	31.21 pcf

Repetitive Member Stress Increase

Unbraced Lengths

First Brace starts at 2.0 ft from Left-Most support
Regular spacing of lateral supports on length of beam = 2.0 ft



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight NOT internally calculated and added
Uniform Load : D = 0.0150, L = 0.060 ksf, Tributary Width = 1.330 ft, (Floor Load)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.935 : 1	Maximum Shear Stress Ratio	=	0.338 : 1
Section used for this span		2x8	Section used for this span		2x8
fb: Actual	=	1,138.64 psi	fv: Actual	=	60.76 psi
F'b	=	1,218.32 psi	F'v	=	180.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	5.000 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.237 in	Ratio =	506 >=360	Span: 1 : L Only
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection	0.296 in	Ratio =	405 >=240	Span: 1 : +D+L
Max Upward Total Deflection	0 in	Ratio =	0 <240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 1.971 ft	1	0.131	0.075	0.90	1.00	1.00	0.98	1.200	1.00	1.00	1.15	0.16	144.1	1,099.7	0.09	12.2	162.0
Length = 2.007 ft	1	0.199	0.075	0.90	1.00	1.00	0.98	1.200	1.00	1.00	1.15	0.24	218.2	1,099.2	0.06	12.2	162.0
Length = 2.007 ft	1	0.207	0.075	0.90	1.00	1.00	0.98	1.200	1.00	1.00	1.15	0.25	227.7	1,099.2	0.02	12.2	162.0
Length = 2.007 ft	1	0.199	0.075	0.90	1.00	1.00	0.98	1.200	1.00	1.00	1.15	0.24	218.9	1,099.2	0.06	12.2	162.0
Length = 2.007 ft	1	0.133	0.075	0.90	1.00	1.00	0.98	1.200	1.00	1.00	1.15	0.16	146.1	1,099.2	0.09	12.2	162.0
+D+L					1.00	1.00	0.98	1.200	1.00	1.00	1.15			0.0	0.00	0.0	0.0

AHBL Engineers
2215 North 30th Street
Suite 300
Tacoma, WA 98403
253.383.2422

Project Title: Kittitas Historic Depot
Engineer: ADM
Project ID: 2230784.20
Project Descr: Improvements to Existing Depot Building

Wood Beam

Project File: 2230784.ec6

DESCRIPTION: Existing Floor Joist - 10ft Span

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
Length = 1.971 ft	1	0.591	0.338	1.00	1.00	1.00	0.98	1.200	1.00	1.00	1.15	0.79	720.7	1,218.9	0.44	60.8	180.0
Length = 2.007 ft	1	0.896	0.338	1.00	1.00	1.00	0.98	1.200	1.00	1.00	1.15	1.19	1,091.1	1,218.3	0.30	60.8	180.0
Length = 2.007 ft	1	0.935	0.338	1.00	1.00	1.00	0.98	1.200	1.00	1.00	1.15	1.25	1,138.6	1,218.3	0.10	60.8	180.0
Length = 2.007 ft	1	0.898	0.338	1.00	1.00	1.00	0.98	1.200	1.00	1.00	1.15	1.20	1,094.4	1,218.3	0.30	60.8	180.0
Length = 2.007 ft	1	0.600	0.338	1.00	1.00	1.00	0.98	1.200	1.00	1.00	1.15	0.80	730.7	1,218.3	0.44	60.8	180.0
+D+0.750L					1.00	1.00	0.98	1.200	1.00	1.00	1.15			0.0	0.00	0.0	0.0
Length = 1.971 ft	1	0.381	0.216	1.25	1.00	1.00	0.97	1.200	1.00	1.00	1.15	0.63	576.6	1,513.3	0.35	48.6	225.0
Length = 2.007 ft	1	0.577	0.216	1.25	1.00	1.00	0.97	1.200	1.00	1.00	1.15	0.96	872.9	1,512.2	0.24	48.6	225.0
Length = 2.007 ft	1	0.602	0.216	1.25	1.00	1.00	0.97	1.200	1.00	1.00	1.15	1.00	910.9	1,512.2	0.08	48.6	225.0
Length = 2.007 ft	1	0.579	0.216	1.25	1.00	1.00	0.97	1.200	1.00	1.00	1.15	0.96	875.5	1,512.2	0.24	48.6	225.0
Length = 2.007 ft	1	0.387	0.216	1.25	1.00	1.00	0.97	1.200	1.00	1.00	1.15	0.64	584.6	1,512.2	0.35	48.6	225.0
+0.60D					1.00	1.00	0.97	1.200	1.00	1.00	1.15			0.0	0.00	0.0	0.0
Length = 1.971 ft	1	0.045	0.025	1.60	1.00	1.00	0.96	1.200	1.00	1.00	1.15	0.09	86.5	1,914.5	0.05	7.3	288.0
Length = 2.007 ft	1	0.068	0.025	1.60	1.00	1.00	0.96	1.200	1.00	1.00	1.15	0.14	130.9	1,912.3	0.04	7.3	288.0
Length = 2.007 ft	1	0.071	0.025	1.60	1.00	1.00	0.96	1.200	1.00	1.00	1.15	0.15	136.6	1,912.3	0.01	7.3	288.0
Length = 2.007 ft	1	0.069	0.025	1.60	1.00	1.00	0.96	1.200	1.00	1.00	1.15	0.14	131.3	1,912.3	0.04	7.3	288.0
Length = 2.007 ft	1	0.046	0.025	1.60	1.00	1.00	0.96	1.200	1.00	1.00	1.15	0.10	87.7	1,912.3	0.05	7.3	288.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.2962	5.036		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	0.499	0.499
Max Upward from Load Combinations	0.499	0.499
Max Upward from Load Cases	0.399	0.399
D Only	0.100	0.100
+D+L	0.499	0.499
+D+0.750L	0.399	0.399
+0.60D	0.060	0.060
L Only	0.399	0.399

AHBL Engineers
2215 North 30th Street
Suite 300
Tacoma, WA 98403
253.383.2422

Project Title: Kittitas Historic Depot
Engineer: ADM
Project ID: 2230784.20
Project Descr: Improvements to Existing Depot Building

Wood Beam

Project File: 2230784.ec6

DESCRIPTION: Floor Joist Supporting Mech Attic - 10ft Span

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : IBC 2021

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : IBC 2021

Wood Species : Douglas Fir-Larch
Wood Grade : No.2

Beam Bracing : Beam bracing is defined as a set spacing over all spans

Fb +	900.0 psi
Fb -	900.0 psi
Fc - Prll	1,350.0 psi
Fc - Perp	625.0 psi
Fv	180.0 psi
Ft	575.0 psi

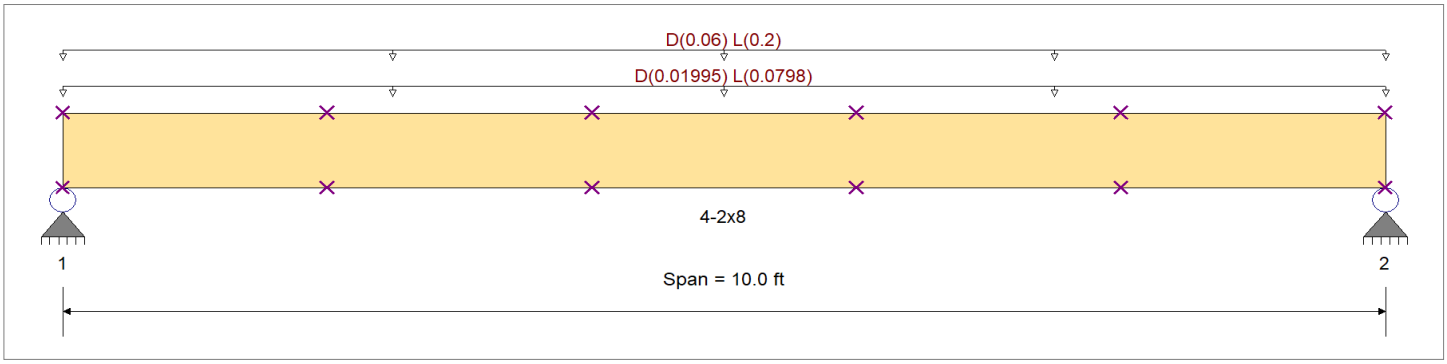
E : Modulus of Elasticity

Ebend- xx	1,600.0 ksi
Eminbend - xx	580.0 ksi
Density	31.210 pcf

Repetitive Member Stress Increase

Unbraced Lengths

First Brace starts at 2.0 ft from Left-Most support
Regular spacing of lateral supports on length of beam = 2.0 ft



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight NOT internally calculated and added
Uniform Load : D = 0.0150, L = 0.060 ksf, Tributary Width = 1.330 ft, (Floor Load)
Uniform Load : D = 0.0150, L = 0.050 ksf, Tributary Width = 4.0 ft, (Mech Attic Load)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.827 : 1	Maximum Shear Stress Ratio	=	0.304 : 1
Section used for this span		4-2x8	Section used for this span		4-2x8
fb: Actual	=	1,026.63 psi	fv: Actual	=	54.78 psi
F'b	=	1,240.87 psi	F'v	=	180.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	5.000 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.208 in	Ratio =	577 >=360	Span: 1 : L Only
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection	0.267 in	Ratio =	449 >=240	Span: 1 : +D+L
Max Upward Total Deflection	0 in	Ratio =	0 <240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 1.971 ft	1	0.129	0.075	0.90	1.00	1.00	1.00	1.200	1.00	1.00	1.15	0.63	144.4	1,116.9	0.35	12.2	162.0
Length = 2.007 ft	1	0.196	0.075	0.90	1.00	1.00	1.00	1.200	1.00	1.00	1.15	0.96	218.6	1,116.9	0.24	12.2	162.0
Length = 2.007 ft	1	0.204	0.075	0.90	1.00	1.00	1.00	1.200	1.00	1.00	1.15	1.00	228.2	1,116.9	0.08	12.2	162.0
Length = 2.007 ft	1	0.196	0.075	0.90	1.00	1.00	1.00	1.200	1.00	1.00	1.15	0.96	219.3	1,116.9	0.24	12.2	162.0
Length = 2.007 ft	1	0.131	0.075	0.90	1.00	1.00	1.00	1.200	1.00	1.00	1.15	0.64	146.4	1,116.9	0.35	12.2	162.0

AHBL Engineers
2215 North 30th Street
Suite 300
Tacoma, WA 98403
253.383.2422

Project Title: Kittitas Historic Depot
Engineer: ADM
Project ID: 2230784.20
Project Descr: Improvements to Existing Depot Building

Wood Beam

Project File: 2230784.ec6

DESCRIPTION: Floor Joist Supporting Mech Attic - 10ft Span

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+D+L					1.00	1.00	1.00	1.200	1.00	1.00	1.15			0.0	0.00	0.0	0.0
Length = 1.971 ft	1	0.524	0.304	1.00	1.00	1.00	1.00	1.200	1.00	1.00	1.15	2.85	649.8	1,240.9	1.59	54.8	180.0
Length = 2.007 ft	1	0.793	0.304	1.00	1.00	1.00	1.00	1.200	1.00	1.00	1.15	4.31	983.8	1,240.9	1.09	54.8	180.0
Length = 2.007 ft	1	0.827	0.304	1.00	1.00	1.00	1.00	1.200	1.00	1.00	1.15	4.50	1,026.6	1,240.9	0.37	54.8	180.0
Length = 2.007 ft	1	0.795	0.304	1.00	1.00	1.00	1.00	1.200	1.00	1.00	1.15	4.32	986.8	1,240.9	1.08	54.8	180.0
Length = 2.007 ft	1	0.531	0.304	1.00	1.00	1.00	1.00	1.200	1.00	1.00	1.15	2.89	658.8	1,240.9	1.59	54.8	180.0
+D+0.750L					1.00	1.00	1.00	1.200	1.00	1.00	1.15			0.0	0.00	0.0	0.0
Length = 1.971 ft	1	0.338	0.196	1.25	1.00	1.00	1.00	1.200	1.00	1.00	1.15	2.29	523.5	1,550.8	1.28	44.1	225.0
Length = 2.007 ft	1	0.511	0.196	1.25	1.00	1.00	1.00	1.200	1.00	1.00	1.15	3.47	792.5	1,550.7	0.88	44.1	225.0
Length = 2.007 ft	1	0.533	0.196	1.25	1.00	1.00	1.00	1.200	1.00	1.00	1.15	3.62	827.0	1,550.7	0.30	44.1	225.0
Length = 2.007 ft	1	0.513	0.196	1.25	1.00	1.00	1.00	1.200	1.00	1.00	1.15	3.48	794.9	1,550.7	0.87	44.1	225.0
Length = 2.007 ft	1	0.342	0.196	1.25	1.00	1.00	1.00	1.200	1.00	1.00	1.15	2.32	530.7	1,550.7	1.28	44.1	225.0
+0.60D					1.00	1.00	1.00	1.200	1.00	1.00	1.15			0.0	0.00	0.0	0.0
Length = 1.971 ft	1	0.044	0.025	1.60	1.00	1.00	1.00	1.200	1.00	1.00	1.15	0.38	86.6	1,984.3	0.21	7.3	288.0
Length = 2.007 ft	1	0.066	0.025	1.60	1.00	1.00	1.00	1.200	1.00	1.00	1.15	0.57	131.2	1,984.3	0.15	7.3	288.0
Length = 2.007 ft	1	0.069	0.025	1.60	1.00	1.00	1.00	1.200	1.00	1.00	1.15	0.60	136.9	1,984.3	0.05	7.3	288.0
Length = 2.007 ft	1	0.066	0.025	1.60	1.00	1.00	1.00	1.200	1.00	1.00	1.15	0.58	131.6	1,984.3	0.14	7.3	288.0
Length = 2.007 ft	1	0.044	0.025	1.60	1.00	1.00	1.00	1.200	1.00	1.00	1.15	0.38	87.9	1,984.3	0.21	7.3	288.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.2671	5.036		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	1.799	1.799
Max Upward from Load Combinations	1.799	1.799
Max Upward from Load Cases	1.399	1.399
D Only	0.400	0.400
+D+L	1.799	1.799
+D+0.750L	1.449	1.449
+0.60D	0.240	0.240
L Only	1.399	1.399

AHBL Engineers
2215 North 30th Street
Suite 300
Tacoma, WA 98403
253.383.2422

Project Title: Kittitas Historic Depot
Engineer: ADM
Project ID: 2230784.20
Project Descr: Improvements to Existing Depot Building

Wood Beam

Project File: 2230784.ec6

DESCRIPTION: Existing Floor Joist - 13ft Span

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : IBC 2021

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : IBC 2021

Wood Species : Douglas Fir-Larch
Wood Grade : No.2

Beam Bracing : Beam bracing is defined as a set spacing over all spans

Fb +	900.0 psi
Fb -	900.0 psi
Fc - Prll	1,350.0 psi
Fc - Perp	625.0 psi
Fv	180.0 psi
Ft	575.0 psi

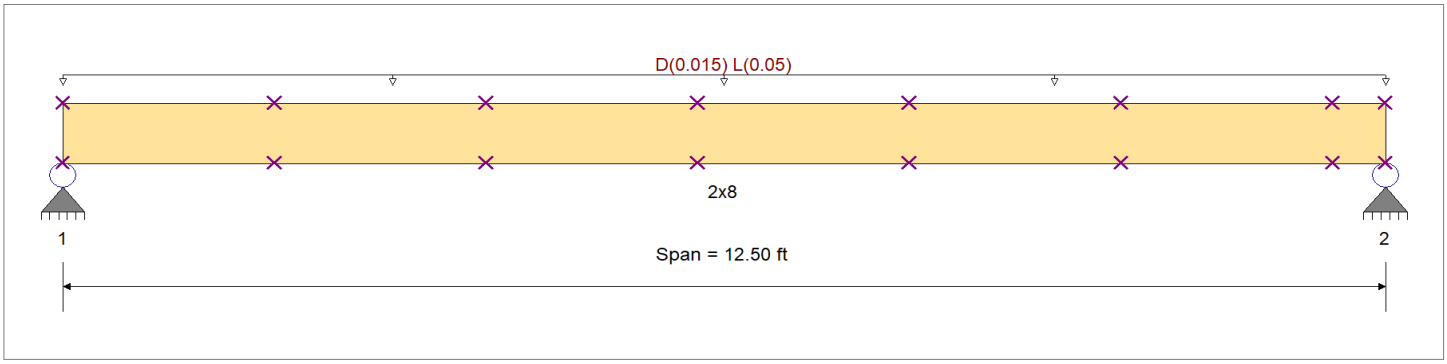
E : Modulus of Elasticity

Ebend- xx	1,600.0 ksi
Eminbend - xx	580.0 ksi
Density	31.210 pcf

Repetitive Member Stress Increase

Unbraced Lengths

First Brace starts at 2.0 ft from Left-Most support
Regular spacing of lateral supports on length of beam = 2.0 ft



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight NOT internally calculated and added
Uniform Load : D = 0.0150, L = 0.050 ksf, Tributary Width = 1.0 ft, (Floor Load)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.952 : 1	Maximum Shear Stress Ratio	=	0.282 : 1
Section used for this span		2x8	Section used for this span		2x8
fb: Actual	=	1,159.33 psi	fv: Actual	=	50.72 psi
F'b	=	1,218.32 psi	F'v	=	180.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	6.250 ft	Location of maximum on span	=	11.907 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.362 in	Ratio =	413 >=360	Span: 1 : L Only
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection	0.471 in	Ratio =	318 >=240	Span: 1 : +D+L
Max Upward Total Deflection	0 in	Ratio =	0 <240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 1.962 ft	1	0.129	0.072	0.90	1.00	1.00	0.98	1.200	1.00	1.00	1.15	0.16	141.6	1,099.8	0.08	11.7	162.0
Length = 2.007 ft	1	0.211	0.072	0.90	1.00	1.00	0.98	1.200	1.00	1.00	1.15	0.25	231.9	1,099.2	0.06	11.7	162.0
Length = 2.007 ft	1	0.243	0.072	0.90	1.00	1.00	0.98	1.200	1.00	1.00	1.15	0.29	267.0	1,099.2	0.03	11.7	162.0
Length = 2.007 ft	1	0.243	0.072	0.90	1.00	1.00	0.98	1.200	1.00	1.00	1.15	0.29	267.5	1,099.2	0.03	11.7	162.0
Length = 2.007 ft	1	0.225	0.072	0.90	1.00	1.00	0.98	1.200	1.00	1.00	1.15	0.27	247.0	1,099.2	0.06	11.7	162.0
Length = 2.007 ft	1	0.156	0.072	0.90	1.00	1.00	0.98	1.200	1.00	1.00	1.15	0.19	171.7	1,099.2	0.08	11.7	162.0

AHBL Engineers
2215 North 30th Street
Suite 300
Tacoma, WA 98403
253.383.2422

Project Title: Kittitas Historic Depot
Engineer: ADM
Project ID: 2230784.20
Project Descr: Improvements to Existing Depot Building

Wood Beam

Project File: 2230784.ec6

DESCRIPTION: Existing Floor Joist - 13ft Span

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
Length = 0.5018 ft	1	0.037	0.072	0.90	1.00	1.00	1.00	1.200	1.00	1.00	1.15	0.05	41.2	1,114.0	0.08	11.7	162.0
+D+L					1.00	1.00	1.00	1.200	1.00	1.00	1.15			0.0	0.00	0.0	0.0
Length = 1.962 ft	1	0.503	0.282	1.00	1.00	1.00	0.98	1.200	1.00	1.00	1.15	0.67	613.5	1,219.0	0.37	50.7	180.0
Length = 2.007 ft	1	0.825	0.282	1.00	1.00	1.00	0.98	1.200	1.00	1.00	1.15	1.10	1,004.9	1,218.3	0.28	50.7	180.0
Length = 2.007 ft	1	0.950	0.282	1.00	1.00	1.00	0.98	1.200	1.00	1.00	1.15	1.27	1,157.1	1,218.3	0.15	50.7	180.0
Length = 2.007 ft	1	0.952	0.282	1.00	1.00	1.00	0.98	1.200	1.00	1.00	1.15	1.27	1,159.3	1,218.3	0.11	50.7	180.0
Length = 2.007 ft	1	0.878	0.282	1.00	1.00	1.00	0.98	1.200	1.00	1.00	1.15	1.17	1,070.1	1,218.3	0.24	50.7	180.0
Length = 2.007 ft	1	0.611	0.282	1.00	1.00	1.00	0.98	1.200	1.00	1.00	1.15	0.81	744.0	1,218.3	0.37	50.7	180.0
Length = 0.5018 ft	1	0.144	0.282	1.00	1.00	1.00	1.00	1.200	1.00	1.00	1.15	0.20	178.7	1,237.3	0.37	50.7	180.0
+D+0.750L					1.00	1.00	1.00	1.200	1.00	1.00	1.15			0.0	0.00	0.0	0.0
Length = 1.962 ft	1	0.327	0.182	1.25	1.00	1.00	0.97	1.200	1.00	1.00	1.15	0.54	495.6	1,513.5	0.30	41.0	225.0
Length = 2.007 ft	1	0.537	0.182	1.25	1.00	1.00	0.97	1.200	1.00	1.00	1.15	0.89	811.7	1,512.2	0.23	41.0	225.0
Length = 2.007 ft	1	0.618	0.182	1.25	1.00	1.00	0.97	1.200	1.00	1.00	1.15	1.02	934.6	1,512.2	0.12	41.0	225.0
Length = 2.007 ft	1	0.619	0.182	1.25	1.00	1.00	0.97	1.200	1.00	1.00	1.15	1.03	936.4	1,512.2	0.09	41.0	225.0
Length = 2.007 ft	1	0.572	0.182	1.25	1.00	1.00	0.97	1.200	1.00	1.00	1.15	0.95	864.3	1,512.2	0.20	41.0	225.0
Length = 2.007 ft	1	0.397	0.182	1.25	1.00	1.00	0.97	1.200	1.00	1.00	1.15	0.66	600.9	1,512.2	0.30	41.0	225.0
Length = 0.5018 ft	1	0.093	0.182	1.25	1.00	1.00	1.00	1.200	1.00	1.00	1.15	0.16	144.3	1,545.0	0.30	41.0	225.0
+0.60D					1.00	1.00	1.00	1.200	1.00	1.00	1.15			0.0	0.00	0.0	0.0
Length = 1.962 ft	1	0.044	0.024	1.60	1.00	1.00	0.96	1.200	1.00	1.00	1.15	0.09	85.0	1,915.0	0.05	7.0	288.0
Length = 2.007 ft	1	0.073	0.024	1.60	1.00	1.00	0.96	1.200	1.00	1.00	1.15	0.15	139.1	1,912.3	0.04	7.0	288.0
Length = 2.007 ft	1	0.084	0.024	1.60	1.00	1.00	0.96	1.200	1.00	1.00	1.15	0.18	160.2	1,912.3	0.02	7.0	288.0
Length = 2.007 ft	1	0.084	0.024	1.60	1.00	1.00	0.96	1.200	1.00	1.00	1.15	0.18	160.5	1,912.3	0.02	7.0	288.0
Length = 2.007 ft	1	0.077	0.024	1.60	1.00	1.00	0.96	1.200	1.00	1.00	1.15	0.16	148.2	1,912.3	0.03	7.0	288.0
Length = 2.007 ft	1	0.054	0.024	1.60	1.00	1.00	0.96	1.200	1.00	1.00	1.15	0.11	103.0	1,912.3	0.05	7.0	288.0
Length = 0.5018 ft	1	0.013	0.024	1.60	1.00	1.00	0.99	1.200	1.00	1.00	1.15	0.03	24.7	1,974.6	0.05	7.0	288.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.4712	6.296		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	0.406	0.406
Max Upward from Load Combinations	0.406	0.406
Max Upward from Load Cases	0.313	0.313
D Only	0.094	0.094
+D+L	0.406	0.406
+D+0.750L	0.328	0.328
+0.60D	0.056	0.056
L Only	0.313	0.313

AHBL Engineers
2215 North 30th Street
Suite 300
Tacoma, WA 98403
253.383.2422

Project Title: Kittitas Historic Depot
Engineer: ADM
Project ID: 2230784.20
Project Descr: Improvements to Existing Depot Building

Wood Beam

Project File: 2230784.ec6

DESCRIPTION: Existing Floor Beam - 10ft Span

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : IBC 2021

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : IBC 2021

Wood Species : Douglas Fir-Larch
Wood Grade : No.1

Beam Bracing : Beam bracing is defined as a set spacing over all spans

Fb +	1350 psi
Fb -	1350 psi
Fc - Prll	925 psi
Fc - Perp	625 psi
Fv	170 psi
Ft	675 psi

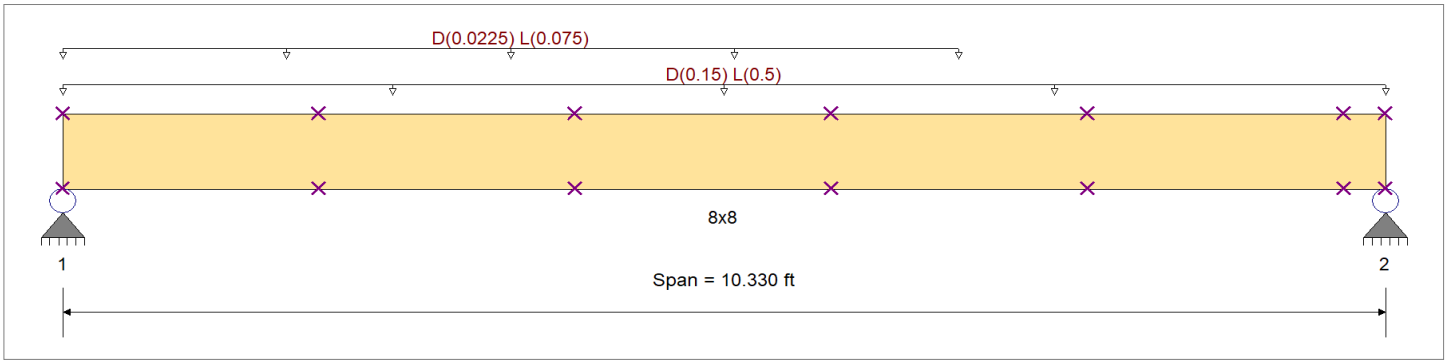
E : Modulus of Elasticity

Ebend- xx	1600 ksi
Eminbend - xx	580 ksi
Density	31.21 pcf

Repetitive Member Stress Increase

Unbraced Lengths

First Brace starts at 2.0 ft from Left-Most support
Regular spacing of lateral supports on length of beam = 2.0 ft



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Uniform Load : D = 0.0150, L = 0.050 ksf, Tributary Width = 10.0 ft, (Floor Load)
Uniform Load : D = 0.0150, L = 0.050 ksf, Extent = 0.0 -->> 7.0 ft, Tributary Width = 1.50 ft, (Floor Load)

DESIGN SUMMARY

Design N.G.

Maximum Bending Stress Ratio	=	1.084 : 1	Maximum Shear Stress Ratio	=	0.535 : 1
Section used for this span		8x8	Section used for this span		8x8
fb: Actual	=	1,683.58 psi	fv: Actual	=	91.02 psi
F'b	=	1,552.50 psi	F'v	=	170.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	5.090 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.341 in	Ratio =	363 >=360	Span: 1 : L Only
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection	0.450 in	Ratio =	275 >=240	Span: 1 : +D+L
Max Upward Total Deflection	0 in	Ratio =	0 <240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 1.998 ft	1	0.185	0.145	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.15	1.51	258.3	1,397.3	0.83	22.1	153.0
Length = 1.998 ft	1	0.280	0.145	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.15	2.29	390.7	1,397.3	0.57	22.1	153.0
Length = 1.998 ft	1	0.293	0.145	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.15	2.40	409.9	1,397.3	0.20	22.1	153.0
Length = 1.998 ft	1	0.284	0.145	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.15	2.33	397.2	1,397.3	0.51	22.1	153.0
Length = 1.998 ft	1	0.200	0.145	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.15	1.64	279.9	1,397.3	0.79	22.1	153.0

AHBL Engineers
2215 North 30th Street
Suite 300
Tacoma, WA 98403
253.383.2422

Project Title: Kittitas Historic Depot
Engineer: ADM
Project ID: 2230784.20
Project Descr: Improvements to Existing Depot Building

Wood Beam

Project File: 2230784.ec6

DESCRIPTION: Existing Floor Beam - 10ft Span

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
Length = 0.3393 ft	1	0.036	0.145	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.15	0.29	50.0	1,397.3	0.79	22.1	153.0
+D+L					1.00	1.00	1.00	1.000	1.00	1.00	1.15			0.0	0.00	0.0	0.0
Length = 1.998 ft	1	0.684	0.535	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.15	6.22	1,061.4	1,552.5	3.41	91.0	170.0
Length = 1.998 ft	1	1.034	0.535	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.15	9.41	1,605.2	1,552.5	2.35	91.0	170.0
Length = 1.998 ft	1	1.084	0.535	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.15	9.86	1,683.6	1,552.5	0.84	91.0	170.0
Length = 1.998 ft	1	1.051	0.535	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.15	9.56	1,631.3	1,552.5	2.10	91.0	170.0
Length = 1.998 ft	1	0.739	0.535	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.15	6.73	1,147.9	1,552.5	3.25	91.0	170.0
Length = 0.3393 ft	1	0.132	0.535	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.15	1.20	204.9	1,552.5	3.25	91.0	170.0
+D+0.750L					1.00	1.00	1.00	1.000	1.00	1.00	1.15			0.0	0.00	0.0	0.0
Length = 1.998 ft	1	0.443	0.347	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.15	5.04	860.6	1,940.6	2.77	73.8	212.5
Length = 1.998 ft	1	0.671	0.347	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.15	7.63	1,301.5	1,940.6	1.91	73.8	212.5
Length = 1.998 ft	1	0.703	0.347	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.15	8.00	1,365.2	1,940.6	0.68	73.8	212.5
Length = 1.998 ft	1	0.682	0.347	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.15	7.75	1,322.8	1,940.6	1.71	73.8	212.5
Length = 1.998 ft	1	0.480	0.347	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.15	5.45	930.9	1,940.6	2.64	73.8	212.5
Length = 0.3393 ft	1	0.086	0.347	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.15	0.97	166.2	1,940.6	2.64	73.8	212.5
+0.60D					1.00	1.00	1.00	1.000	1.00	1.00	1.15			0.0	0.00	0.0	0.0
Length = 1.998 ft	1	0.062	0.049	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.15	0.91	155.0	2,484.0	0.50	13.3	272.0
Length = 1.998 ft	1	0.094	0.049	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.15	1.37	234.4	2,484.0	0.34	13.3	272.0
Length = 1.998 ft	1	0.099	0.049	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.15	1.44	245.9	2,484.0	0.12	13.3	272.0
Length = 1.998 ft	1	0.096	0.049	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.15	1.40	238.3	2,484.0	0.31	13.3	272.0
Length = 1.998 ft	1	0.068	0.049	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.15	0.98	167.9	2,484.0	0.48	13.3	272.0
Length = 0.3393 ft	1	0.012	0.049	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.15	0.18	30.0	2,484.0	0.48	13.3	272.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.4503	5.165		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	3.871	3.651
Max Upward from Load Combinations	3.871	3.651
Max Upward from Load Cases	2.930	2.760
D Only	0.942	0.891
+D+L	3.871	3.651
+D+0.750L	3.139	2.961
+0.60D	0.565	0.535
L Only	2.930	2.760

AHBL Engineers
2215 North 30th Street
Suite 300
Tacoma, WA 98403
253.383.2422

Project Title: Kittitas Historic Depot
Engineer: ADM
Project ID: 2230784.20
Project Descr: Improvements to Existing Depot Building

Wood Beam

Project File: 2230784.ec6

DESCRIPTION: Existing Floor Beam - 8ft Span

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : IBC 2021

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : IBC 2021

Wood Species : Douglas Fir-Larch
Wood Grade : No.1

Beam Bracing : Beam bracing is defined as a set spacing over all spans

Fb +	1,350.0 psi
Fb -	1,350.0 psi
Fc - Prll	925.0 psi
Fc - Perp	625.0 psi
Fv	170.0 psi
Ft	675.0 psi

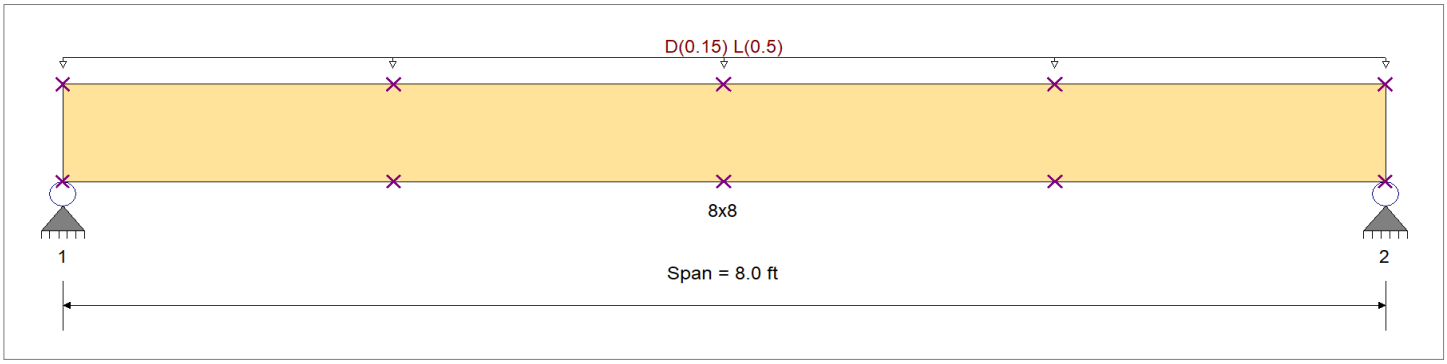
E : Modulus of Elasticity

Ebend- xx	1,600.0 ksi
Eminbend - xx	580.0 ksi
Density	31.210 pcf

Repetitive Member Stress Increase

Unbraced Lengths

First Brace starts at 2.0 ft from Left-Most support
Regular spacing of lateral supports on length of beam = 2.0 ft



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Uniform Load : D = 0.0150, L = 0.050 ksf, Tributary Width = 10.0 ft, (Floor Load)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.582 : 1	Maximum Shear Stress Ratio	=	0.352 : 1
Section used for this span		8x8	Section used for this span		8x8
fb: Actual	=	904.11 psi	fv: Actual	=	59.81 psi
F'b	=	1,552.50 psi	F'v	=	170.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	4.000 ft	Location of maximum on span	=	7.387 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.110 in	Ratio =	873 >=360	Span: 1 : L Only
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection	0.146 in	Ratio =	659 >=240	Span: 1 : +D+L
Max Upward Total Deflection	0 in	Ratio =	0 <240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 1.985 ft	1	0.118	0.096	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.15	0.97	165.3	1,397.3	0.55	14.6	153.0
Length = 2.015 ft	1	0.158	0.096	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.15	1.30	221.4	1,397.3	0.33	14.6	153.0
Length = 1.985 ft	1	0.158	0.096	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.15	1.30	221.4	1,397.3	0.32	14.6	153.0
Length = 2.015 ft	1	0.119	0.096	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.15	0.98	166.9	1,397.3	0.55	14.6	153.0
+D+L					1.00	1.00	1.00	1.000	1.00	1.00	1.15			0.0	0.00	0.0	0.0
Length = 1.985 ft	1	0.435	0.352	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.15	3.95	674.8	1,552.5	2.24	59.8	170.0

AHBL Engineers
2215 North 30th Street
Suite 300
Tacoma, WA 98403
253.383.2422

Project Title: Kittitas Historic Depot
Engineer: ADM
Project ID: 2230784.20
Project Descr: Improvements to Existing Depot Building

Wood Beam

Project File: 2230784.ec6

DESCRIPTION: Existing Floor Beam - 8ft Span

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
Length = 2.015 ft	1	0.582	0.352	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.15	5.30	904.1	1,552.5	1.33	59.8	170.0
Length = 1.985 ft	1	0.582	0.352	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.15	5.30	904.1	1,552.5	1.31	59.8	170.0
Length = 2.015 ft	1	0.439	0.352	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.15	3.99	681.4	1,552.5	2.24	59.8	170.0
+D+0.750L					1.00	1.00	1.00	1.000	1.00	1.00	1.15			0.0	0.00	0.0	0.0
Length = 1.985 ft	1	0.282	0.228	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.15	3.21	547.4	1,940.6	1.82	48.5	212.5
Length = 2.015 ft	1	0.378	0.228	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.15	4.30	733.4	1,940.6	1.08	48.5	212.5
Length = 1.985 ft	1	0.378	0.228	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.15	4.30	733.4	1,940.6	1.07	48.5	212.5
Length = 2.015 ft	1	0.285	0.228	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.15	3.24	552.8	1,940.6	1.82	48.5	212.5
+0.60D					1.00	1.00	1.00	1.000	1.00	1.00	1.15			0.0	0.00	0.0	0.0
Length = 1.985 ft	1	0.040	0.032	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.15	0.58	99.2	2,484.0	0.33	8.8	272.0
Length = 2.015 ft	1	0.053	0.032	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.15	0.78	132.9	2,484.0	0.20	8.8	272.0
Length = 1.985 ft	1	0.053	0.032	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.15	0.78	132.9	2,484.0	0.19	8.8	272.0
Length = 2.015 ft	1	0.040	0.032	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.15	0.59	100.1	2,484.0	0.33	8.8	272.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.1455	4.029		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	2.649	2.649
Max Upward from Load Combinations	2.649	2.649
Max Upward from Load Cases	2.000	2.000
D Only	0.649	0.649
+D+L	2.649	2.649
+D+0.750L	2.149	2.149
+0.60D	0.389	0.389
L Only	2.000	2.000

AHBL Engineers
2215 North 30th Street
Suite 300
Tacoma, WA 98403
253.383.2422

Project Title: Kittitas Historic Depot
Engineer: ADM
Project ID: 2230784.20
Project Descr: Improvements to Existing Depot Building

Wood Beam

Project File: 2230784.ec6

DESCRIPTION: Existing Floor Beam at Mech Platform Joists - 8ft Span

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : IBC 2021

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : IBC 2021

Wood Species : Douglas Fir-Larch
Wood Grade : No.1

Beam Bracing : Beam bracing is defined as a set spacing over all spans

Fb +	1,350.0 psi
Fb -	1,350.0 psi
Fc - Prll	925.0 psi
Fc - Perp	625.0 psi
Fv	170.0 psi
Ft	675.0 psi

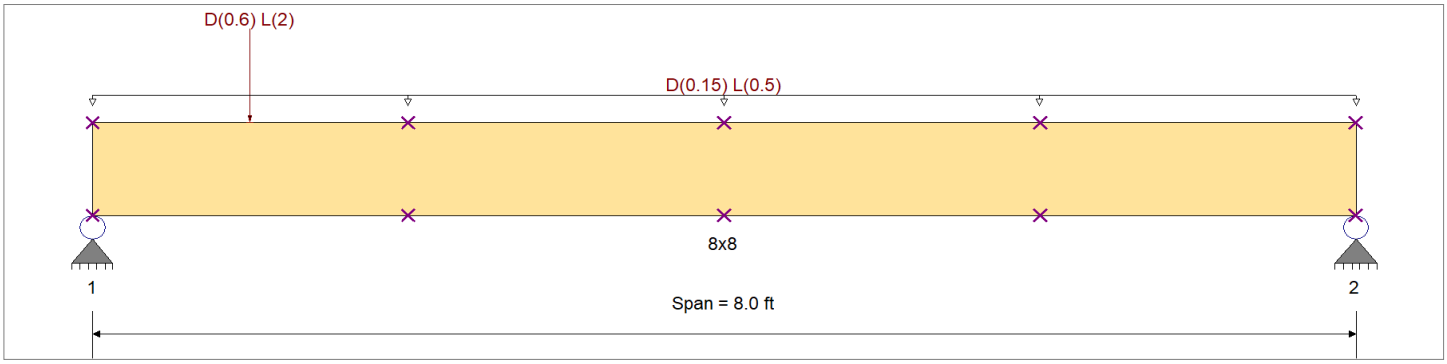
E : Modulus of Elasticity

Ebend- xx	1,600.0 ksi
Eminbend - xx	580.0 ksi
Density	31.210 pcf

Repetitive Member Stress Increase

Unbraced Lengths

First Brace starts at 2.0 ft from Left-Most support
Regular spacing of lateral supports on length of beam = 2.0 ft



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Uniform Load : D = 0.0150, L = 0.050 ksf, Tributary Width = 10.0 ft, (Floor Load)
Point Load : D = 0.60, L = 2.0 k @ 1.0 ft, (Mech Platform)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.734 : 1	Maximum Shear Stress Ratio	=	0.709 : 1
Section used for this span		8x8	Section used for this span		8x8
fb: Actual	=	1,139.59 psi	fv: Actual	=	120.47 psi
F'b	=	1,552.50 psi	F'v	=	170.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	3.504 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.142 in	Ratio =	674 >=360	Span: 1 : L Only
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection	0.188 in	Ratio =	511 >=240	Span: 1 : +D+L
Max Upward Total Deflection	0 in	Ratio =	0 <240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 1.985 ft	1	0.173	0.187	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.15	1.42	242.3	1,397.3	1.07	28.6	153.0
Length = 2.015 ft	1	0.197	0.187	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.15	1.61	275.6	1,397.3	0.25	28.6	153.0
Length = 1.985 ft	1	0.195	0.187	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.15	1.60	272.6	1,397.3	0.40	28.6	153.0
Length = 2.015 ft	1	0.138	0.187	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.15	1.13	192.7	1,397.3	0.62	28.6	153.0
+D+L					1.00	1.00	1.00	1.000	1.00	1.00	1.15			0.0	0.00	0.0	0.0

AHBL Engineers
2215 North 30th Street
Suite 300
Tacoma, WA 98403
253.383.2422

Project Title: Kittitas Historic Depot
Engineer: ADM
Project ID: 2230784.20
Project Descr: Improvements to Existing Depot Building

Wood Beam

Project File: 2230784.ec6

DESCRIPTION: Existing Floor Beam at Mech Platform Joists - 8ft Span

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
Length = 1.985 ft	1	0.650	0.709	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.15	5.91	1,008.4	1,552.5	4.52	120.5	170.0
Length = 2.015 ft	1	0.734	0.709	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.15	6.68	1,139.6	1,552.5	1.01	120.5	170.0
Length = 1.985 ft	1	0.725	0.709	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.15	6.60	1,126.0	1,552.5	1.64	120.5	170.0
Length = 2.015 ft	1	0.511	0.709	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.15	4.65	793.1	1,552.5	2.57	120.5	170.0
+D+0.750L					1.00	1.00	1.00	1.000	1.00	1.00	1.15			0.0	0.00	0.0	0.0
Length = 1.985 ft	1	0.421	0.459	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.15	4.79	816.9	1,940.6	3.66	97.5	212.5
Length = 2.015 ft	1	0.476	0.459	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.15	5.41	923.6	1,940.6	0.82	97.5	212.5
Length = 1.985 ft	1	0.470	0.459	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.15	5.35	912.6	1,940.6	1.33	97.5	212.5
Length = 2.015 ft	1	0.331	0.459	1.25	1.00	1.00	1.00	1.000	1.00	1.00	1.15	3.77	643.0	1,940.6	2.08	97.5	212.5
+0.60D					1.00	1.00	1.00	1.000	1.00	1.00	1.15			0.0	0.00	0.0	0.0
Length = 1.985 ft	1	0.059	0.063	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.15	0.85	145.4	2,484.0	0.64	17.2	272.0
Length = 2.015 ft	1	0.067	0.063	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.15	0.97	165.4	2,484.0	0.15	17.2	272.0
Length = 1.985 ft	1	0.066	0.063	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.15	0.96	163.6	2,484.0	0.24	17.2	272.0
Length = 2.015 ft	1	0.047	0.063	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.15	0.68	115.6	2,484.0	0.37	17.2	272.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.1878	3.883		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	4.924	2.974
Max Upward from Load Combinations	4.924	2.974
Max Upward from Load Cases	3.750	2.250
D Only	1.174	0.724
+D+L	4.924	2.974
+D+0.750L	3.986	2.411
+0.60D	0.704	0.434
L Only	3.750	2.250

AHBL Engineers
2215 North 30th Street
Suite 300
Tacoma, WA 98403
253.383.2422

Project Title: Kittitas Historic Depot
Engineer: ADM
Project ID: 2230784.20
Project Descr: Improvements to Existing Depot Building

Wood Beam

Project File: 2230784.ec6

DESCRIPTION: Bathroom Ceiling Joists

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : IBC 2021

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : IBC 2021

Wood Species : Douglas Fir-Larch
Wood Grade : No.2

Beam Bracing : Beam bracing is defined as a set spacing over all spans

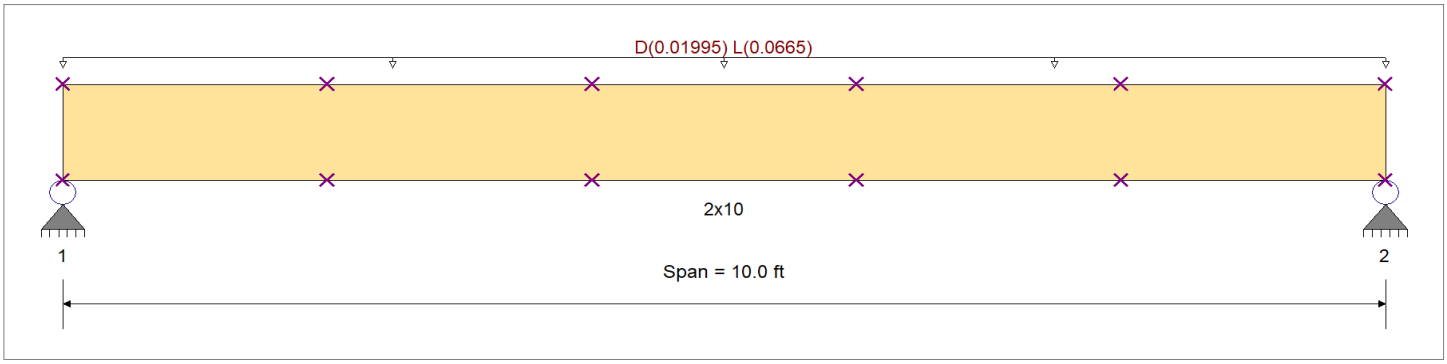
Fb +	900 psi
Fb -	900 psi
Fc - Prll	1350 psi
Fc - Perp	625 psi
Fv	180 psi
Ft	575 psi

E : Modulus of Elasticity

Ebend- xx	1600 ksi
Eminbend - xx	580 ksi
Density	31.21 pcf

Unbraced Lengths

First Brace starts at 2.0 ft from Left-Most support
Regular spacing of lateral supports on length of beam = 2.0 ft



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight NOT internally calculated and added
Uniform Load : D = 0.0150, L = 0.050 ksf, Tributary Width = 1.330 ft, (Ceiling Load)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.625 : 1	Maximum Shear Stress Ratio	=	0.220 : 1
Section used for this span		2x10	Section used for this span		2x10
fb: Actual	=	606.22 psi	fv: Actual	=	39.57 psi
F'b	=	970.70 psi	F'v	=	180.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	5.000 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.095 in	Ratio =	1262 >=360	Span: 1 : L Only
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a
Max Downward Total Deflection	0.124 in	Ratio =	970 >=180	Span: 1 : +D+L
Max Upward Total Deflection	0 in	Ratio =	0 <180	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 1.971 ft	1	0.101	0.056	0.90	1.00	1.00	0.98	1.100	1.00	1.00	1.00	0.16	88.5	876.2	0.08	9.1	162.0
Length = 2.007 ft	1	0.153	0.056	0.90	1.00	1.00	0.98	1.100	1.00	1.00	1.00	0.24	134.1	875.9	0.06	9.1	162.0
Length = 2.007 ft	1	0.160	0.056	0.90	1.00	1.00	0.98	1.100	1.00	1.00	1.00	0.25	139.9	875.9	0.02	9.1	162.0
Length = 2.007 ft	1	0.154	0.056	0.90	1.00	1.00	0.98	1.100	1.00	1.00	1.00	0.24	134.5	875.9	0.06	9.1	162.0
Length = 2.007 ft	1	0.103	0.056	0.90	1.00	1.00	0.98	1.100	1.00	1.00	1.00	0.16	89.8	875.9	0.08	9.1	162.0
+D+L					1.00	1.00	0.98	1.100	1.00	1.00	1.00			0.0	0.00	0.0	0.0

AHBL Engineers
2215 North 30th Street
Suite 300
Tacoma, WA 98403
253.383.2422

Project Title: Kittitas Historic Depot
Engineer: ADM
Project ID: 2230784.20
Project Descr: Improvements to Existing Depot Building

Wood Beam

Project File: 2230784.ec6

DESCRIPTION: Bathroom Ceiling Joists

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
Length = 1.971 ft	1	0.395	0.220	1.00	1.00	1.00	0.98	1.100	1.00	1.00	1.00	0.68	383.7	971.2	0.37	39.6	180.0
Length = 2.007 ft	1	0.598	0.220	1.00	1.00	1.00	0.98	1.100	1.00	1.00	1.00	1.04	580.9	970.7	0.26	39.6	180.0
Length = 2.007 ft	1	0.625	0.220	1.00	1.00	1.00	0.98	1.100	1.00	1.00	1.00	1.08	606.2	970.7	0.09	39.6	180.0
Length = 2.007 ft	1	0.600	0.220	1.00	1.00	1.00	0.98	1.100	1.00	1.00	1.00	1.04	582.7	970.7	0.26	39.6	180.0
Length = 2.007 ft	1	0.401	0.220	1.00	1.00	1.00	0.98	1.100	1.00	1.00	1.00	0.69	389.0	970.7	0.37	39.6	180.0
+D+0.750L					1.00	1.00	0.98	1.100	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 1.971 ft	1	0.257	0.142	1.25	1.00	1.00	0.97	1.100	1.00	1.00	1.00	0.55	309.9	1,205.5	0.30	32.0	225.0
Length = 2.007 ft	1	0.389	0.142	1.25	1.00	1.00	0.97	1.100	1.00	1.00	1.00	0.84	469.2	1,204.6	0.21	32.0	225.0
Length = 2.007 ft	1	0.406	0.142	1.25	1.00	1.00	0.97	1.100	1.00	1.00	1.00	0.87	489.6	1,204.6	0.07	32.0	225.0
Length = 2.007 ft	1	0.391	0.142	1.25	1.00	1.00	0.97	1.100	1.00	1.00	1.00	0.84	470.6	1,204.6	0.21	32.0	225.0
Length = 2.007 ft	1	0.261	0.142	1.25	1.00	1.00	0.97	1.100	1.00	1.00	1.00	0.56	314.2	1,204.6	0.30	32.0	225.0
+0.60D					1.00	1.00	0.97	1.100	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 1.971 ft	1	0.035	0.019	1.60	1.00	1.00	0.96	1.100	1.00	1.00	1.00	0.09	53.1	1,524.4	0.05	5.5	288.0
Length = 2.007 ft	1	0.053	0.019	1.60	1.00	1.00	0.96	1.100	1.00	1.00	1.00	0.14	80.4	1,522.6	0.04	5.5	288.0
Length = 2.007 ft	1	0.055	0.019	1.60	1.00	1.00	0.96	1.100	1.00	1.00	1.00	0.15	83.9	1,522.6	0.01	5.5	288.0
Length = 2.007 ft	1	0.053	0.019	1.60	1.00	1.00	0.96	1.100	1.00	1.00	1.00	0.14	80.7	1,522.6	0.04	5.5	288.0
Length = 2.007 ft	1	0.035	0.019	1.60	1.00	1.00	0.96	1.100	1.00	1.00	1.00	0.10	53.9	1,522.6	0.05	5.5	288.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.1236	5.036		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	0.432	0.432
Max Upward from Load Combinations	0.432	0.432
Max Upward from Load Cases	0.333	0.333
D Only	0.100	0.100
+D+L	0.432	0.432
+D+0.750L	0.349	0.349
+0.60D	0.060	0.060
L Only	0.333	0.333

AHBL Engineers
2215 North 30th Street
Suite 300
Tacoma, WA 98403
253.383.2422

Project Title: Kittitas Historic Depot
Engineer: ADM
Project ID: 2230784.20
Project Descr: Improvements to Existing Depot Building

Steel Beam

Project File: 2230784.ec6

DESCRIPTION: WT Outrigger

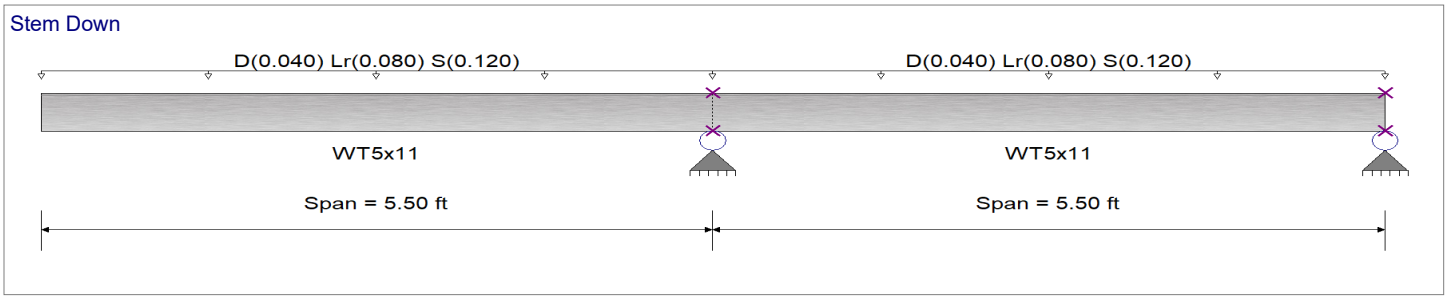
CODE REFERENCES

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Strength Design
Beam Bracing : Completely Unbraced
Bending Axis : Major Axis Bending

Fy : Steel Yield : 36.0 ksi
E: Modulus : 29,000.0 ksi



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading
Load for Span Number 1
Uniform Load : D = 0.010, Lr = 0.020, S = 0.030 ksf, Tributary Width = 4.0 ft, (Roof Load)

Load for Span Number 2
Uniform Load : D = 0.010, Lr = 0.020, S = 0.030 ksf, Tributary Width = 4.0 ft, (Roof Load)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.837 : 1	Maximum Shear Stress Ratio =	0.060 : 1
Section used for this span	WT5x11	Section used for this span	WT5x11
Ma : Applied	2.586 k-ft	Va : Applied	0.9405 k
Mn / Omega : Allowable	3.090 k-ft	Vn/Omega : Allowable	15.80 k
Load Combination	+D+S+H	Load Combination	+D+S+H
		Location of maximum on span	5.500 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.238 in	Ratio =	554	>=360	Span: 2 : S Only
Max Upward Transient Deflection	-0.021 in	Ratio =	3,212	>=360	Span: 2 : Lr Only, LL Comb Run (L*)
Max Downward Total Deflection	0.339 in	Ratio =	389	>=240.	Span: 2 : +D+S+H
Max Upward Total Deflection	-0.029 in	Ratio =	2313	>=240.	Span: 2 : +D+Lr+H, LL Comb Run (L*)

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	VnxVnx/Omega
+D+H												
Dsgn. L = 5.50 ft	1	0.250	0.018		-0.77	0.77	5.16	3.09	1.00	1.00	0.28	26.39 15.80
Dsgn. L = 5.50 ft	2	0.250	0.018		-0.77	0.77	5.16	3.09	2.32	1.00	0.28	26.39 15.80
+D+L+H, LL Comb Run (*L)												
Dsgn. L = 5.50 ft	1	0.250	0.018		-0.77	0.77	5.16	3.09	1.00	1.00	0.28	26.39 15.80
Dsgn. L = 5.50 ft	2	0.250	0.018		-0.77	0.77	5.16	3.09	2.32	1.00	0.28	26.39 15.80
+D+L+H, LL Comb Run (L*)												
Dsgn. L = 5.50 ft	1	0.250	0.018		-0.77	0.77	5.16	3.09	1.00	1.00	0.28	26.39 15.80
Dsgn. L = 5.50 ft	2	0.250	0.018		-0.77	0.77	5.16	3.09	2.32	1.00	0.28	26.39 15.80
+D+L+H, LL Comb Run (LL)												
Dsgn. L = 5.50 ft	1	0.250	0.018		-0.77	0.77	5.16	3.09	1.00	1.00	0.28	26.39 15.80
Dsgn. L = 5.50 ft	2	0.250	0.018		-0.77	0.77	5.16	3.09	2.32	1.00	0.28	26.39 15.80
+D+Lr+H, LL Comb Run (*L)												
Dsgn. L = 5.50 ft	1	0.250	0.032		-0.77	0.77	5.16	3.09	1.00	1.00	0.50	26.39 15.80
Dsgn. L = 5.50 ft	2	0.156	0.032	0.18	-0.77	0.77	8.26	4.94	2.73	1.00	0.50	26.39 15.80
+D+Lr+H, LL Comb Run (L*)												
Dsgn. L = 5.50 ft	1	0.641	0.046		-1.98	1.98	5.16	3.09	1.00	1.00	0.72	26.39 15.80
Dsgn. L = 5.50 ft	2	0.641	0.032		-1.98	1.98	5.16	3.09	1.87	1.00	0.50	26.39 15.80

DESCRIPTION: WT Outrigger

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios		Summary of Moment Values							Summary of Shear Values		
Segment Length	Span #	M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
+D+Lr+H, LL Comb Run (LL)													
Dsgn. L = 5.50 ft	1	0.641	0.046		-1.98	1.98	5.16	3.09	1.00	1.00	0.72	26.39	15.80
Dsgn. L = 5.50 ft	2	0.641	0.046		-1.98	1.98	5.16	3.09	2.32	1.00	0.72	26.39	15.80
+D+S+H													
Dsgn. L = 5.50 ft	1	0.837	0.060		-2.59	2.59	5.16	3.09	1.00	1.00	0.94	26.39	15.80
Dsgn. L = 5.50 ft	2	0.837	0.060		-2.59	2.59	5.16	3.09	2.32	1.00	0.94	26.39	15.80
+D+0.750Lr+0.750L+H, LL Comb													
Dsgn. L = 5.50 ft	1	0.250	0.028		-0.77	0.77	5.16	3.09	1.00	1.00	0.45	26.39	15.80
Dsgn. L = 5.50 ft	2	0.156	0.028	0.12	-0.77	0.77	8.26	4.94	2.98	1.00	0.45	26.39	15.80
+D+0.750Lr+0.750L+H, LL Comb													
Dsgn. L = 5.50 ft	1	0.543	0.039		-1.68	1.68	5.16	3.09	1.00	1.00	0.61	26.39	15.80
Dsgn. L = 5.50 ft	2	0.543	0.028		-1.68	1.68	5.16	3.09	1.91	1.00	0.45	26.39	15.80
+D+0.750Lr+0.750L+H, LL Comb													
Dsgn. L = 5.50 ft	1	0.543	0.039		-1.68	1.68	5.16	3.09	1.00	1.00	0.61	26.39	15.80
Dsgn. L = 5.50 ft	2	0.543	0.039		-1.68	1.68	5.16	3.09	2.32	1.00	0.61	26.39	15.80
+D+0.750L+0.750S+H, LL Comb													
Dsgn. L = 5.50 ft	1	0.690	0.049		-2.13	2.13	5.16	3.09	1.00	1.00	0.78	26.39	15.80
Dsgn. L = 5.50 ft	2	0.690	0.049		-2.13	2.13	5.16	3.09	2.32	1.00	0.78	26.39	15.80
+D+0.750L+0.750S+H, LL Comb													
Dsgn. L = 5.50 ft	1	0.690	0.049		-2.13	2.13	5.16	3.09	1.00	1.00	0.78	26.39	15.80
Dsgn. L = 5.50 ft	2	0.690	0.049		-2.13	2.13	5.16	3.09	2.32	1.00	0.78	26.39	15.80
+D+0.750L+0.750S+H, LL Comb													
Dsgn. L = 5.50 ft	1	0.690	0.049		-2.13	2.13	5.16	3.09	1.00	1.00	0.78	26.39	15.80
Dsgn. L = 5.50 ft	2	0.690	0.049		-2.13	2.13	5.16	3.09	2.32	1.00	0.78	26.39	15.80
+D+0.60W+H													
Dsgn. L = 5.50 ft	1	0.250	0.018		-0.77	0.77	5.16	3.09	1.00	1.00	0.28	26.39	15.80
Dsgn. L = 5.50 ft	2	0.250	0.018		-0.77	0.77	5.16	3.09	2.32	1.00	0.28	26.39	15.80
+D+0.70E+H													
Dsgn. L = 5.50 ft	1	0.250	0.018		-0.77	0.77	5.16	3.09	1.00	1.00	0.28	26.39	15.80
Dsgn. L = 5.50 ft	2	0.250	0.018		-0.77	0.77	5.16	3.09	2.32	1.00	0.28	26.39	15.80
+D+0.750Lr+0.750L+0.450W+H, I													
Dsgn. L = 5.50 ft	1	0.250	0.028		-0.77	0.77	5.16	3.09	1.00	1.00	0.45	26.39	15.80
Dsgn. L = 5.50 ft	2	0.156	0.028	0.12	-0.77	0.77	8.26	4.94	2.98	1.00	0.45	26.39	15.80
+D+0.750Lr+0.750L+0.450W+H, I													
Dsgn. L = 5.50 ft	1	0.543	0.039		-1.68	1.68	5.16	3.09	1.00	1.00	0.61	26.39	15.80
Dsgn. L = 5.50 ft	2	0.543	0.028		-1.68	1.68	5.16	3.09	1.91	1.00	0.45	26.39	15.80
+D+0.750Lr+0.750L+0.450W+H, I													
Dsgn. L = 5.50 ft	1	0.543	0.039		-1.68	1.68	5.16	3.09	1.00	1.00	0.61	26.39	15.80
Dsgn. L = 5.50 ft	2	0.543	0.039		-1.68	1.68	5.16	3.09	2.32	1.00	0.61	26.39	15.80
+D+0.750L+0.750S+0.450W+H, L													
Dsgn. L = 5.50 ft	1	0.690	0.049		-2.13	2.13	5.16	3.09	1.00	1.00	0.78	26.39	15.80
Dsgn. L = 5.50 ft	2	0.690	0.049		-2.13	2.13	5.16	3.09	2.32	1.00	0.78	26.39	15.80
+D+0.750L+0.750S+0.450W+H, L													
Dsgn. L = 5.50 ft	1	0.690	0.049		-2.13	2.13	5.16	3.09	1.00	1.00	0.78	26.39	15.80
Dsgn. L = 5.50 ft	2	0.690	0.049		-2.13	2.13	5.16	3.09	2.32	1.00	0.78	26.39	15.80
+D+0.750L+0.750S+0.450W+H, L													
Dsgn. L = 5.50 ft	1	0.690	0.049		-2.13	2.13	5.16	3.09	1.00	1.00	0.78	26.39	15.80
Dsgn. L = 5.50 ft	2	0.690	0.049		-2.13	2.13	5.16	3.09	2.32	1.00	0.78	26.39	15.80
+D+0.750L+0.750S+0.5250E+H, I													
Dsgn. L = 5.50 ft	1	0.690	0.049		-2.13	2.13	5.16	3.09	1.00	1.00	0.78	26.39	15.80
Dsgn. L = 5.50 ft	2	0.690	0.049		-2.13	2.13	5.16	3.09	2.32	1.00	0.78	26.39	15.80
+D+0.750L+0.750S+0.5250E+H, I													
Dsgn. L = 5.50 ft	1	0.690	0.049		-2.13	2.13	5.16	3.09	1.00	1.00	0.78	26.39	15.80
Dsgn. L = 5.50 ft	2	0.690	0.049		-2.13	2.13	5.16	3.09	2.32	1.00	0.78	26.39	15.80
+D+0.750L+0.750S+0.5250E+H, I													
Dsgn. L = 5.50 ft	1	0.690	0.049		-2.13	2.13	5.16	3.09	1.00	1.00	0.78	26.39	15.80
Dsgn. L = 5.50 ft	2	0.690	0.049		-2.13	2.13	5.16	3.09	2.32	1.00	0.78	26.39	15.80
+0.60D+0.60W+0.60H													
Dsgn. L = 5.50 ft	1	0.150	0.011		-0.46	0.46	5.16	3.09	1.00	1.00	0.17	26.39	15.80
Dsgn. L = 5.50 ft	2	0.150	0.011		-0.46	0.46	5.16	3.09	2.32	1.00	0.17	26.39	15.80
+0.60D+0.70E+0.60H													
Dsgn. L = 5.50 ft	1	0.150	0.011		-0.46	0.46	5.16	3.09	1.00	1.00	0.17	26.39	15.80
Dsgn. L = 5.50 ft	2	0.150	0.011		-0.46	0.46	5.16	3.09	2.32	1.00	0.17	26.39	15.80

AHBL Engineers
2215 North 30th Street
Suite 300
Tacoma, WA 98403
253.383.2422

Project Title: Kittitas Historic Depot
Engineer: ADM
Project ID: 2230784.20
Project Descr: Improvements to Existing Depot Building

Steel Beam

Project File: 2230784.ec6

DESCRIPTION: WT Outrigger

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S+H	1	0.3393	0.000		0.0000	0.000
	2	0.0000	0.000	+D+Lr+H	-0.0285	2.244

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Max Upward from all Load Conditions		1.881	0.220
Max Upward from Load Combinations		1.881	0.220
Max Upward from Load Cases		1.320	0.220
Max Downward from all Load Conditions (Resis			-0.220
Max Downward from Load Combinations (Resi			-0.220
Max Downward from Load Cases (Resisting Up			-0.220
+D+H		0.561	-0.000
+D+L+H, LL Comb Run (*L)		0.561	-0.000
+D+L+H, LL Comb Run (L*)		0.561	-0.000
+D+L+H, LL Comb Run (LL)		0.561	-0.000
+D+Lr+H, LL Comb Run (*L)		0.781	0.220
+D+Lr+H, LL Comb Run (L*)		1.221	-0.220
+D+Lr+H, LL Comb Run (LL)		1.441	
+D+S+H		1.881	-0.000
+D+0.750Lr+0.750L+H, LL Comb Run (*L)		0.726	0.165
+D+0.750Lr+0.750L+H, LL Comb Run (L*)		1.056	-0.165
+D+0.750Lr+0.750L+H, LL Comb Run (LL)		1.221	-0.000
+D+0.750L+0.750S+H, LL Comb Run (*L)		1.551	-0.000
+D+0.750L+0.750S+H, LL Comb Run (L*)		1.551	-0.000
+D+0.750L+0.750S+H, LL Comb Run (LL)		1.551	-0.000
+D+0.60W+H		0.561	-0.000
+D+0.70E+H		0.561	-0.000
+D+0.750Lr+0.750L+0.450W+H, LL Comb Rur		0.726	0.165
+D+0.750Lr+0.750L+0.450W+H, LL Comb Rur		1.056	-0.165
+D+0.750Lr+0.750L+0.450W+H, LL Comb Rur		1.221	-0.000
+D+0.750L+0.750S+0.450W+H, LL Comb Run		1.551	-0.000
+D+0.750L+0.750S+0.450W+H, LL Comb Run		1.551	-0.000
+D+0.750L+0.750S+0.450W+H, LL Comb Run		1.551	-0.000
+D+0.750L+0.750S+0.5250E+H, LL Comb Rur		1.551	-0.000
+D+0.750L+0.750S+0.5250E+H, LL Comb Rur		1.551	-0.000
+D+0.750L+0.750S+0.5250E+H, LL Comb Rur		1.551	-0.000
+0.60D+0.60W+0.60H		0.337	-0.000
+0.60D+0.70E+0.60H		0.337	-0.000
D Only		0.561	-0.000
Lr Only, LL Comb Run (*L)		0.220	0.220
Lr Only, LL Comb Run (L*)		0.660	-0.220
Lr Only, LL Comb Run (LL)		0.880	-0.000
S Only		1.320	-0.000
H Only			

Stormwater Technical Information Report

PREPARED FOR:

Washington State Parks and Recreation Commission
1111 Israel Road SW
PO Box 42650
Tumwater, WA 98505-2650

PROJECT:

Kittitas Depot Historic Preservation
116 Main Street, Unit B
Kittitas, WA 98934
2230784.10

PREPARED BY:

Chris Flyckt, PE
Project Engineer

REVIEWED BY:

Scott T. Kaul, PE, LEED AP
Associate Principal

DATE:

August 2024

Stormwater Technical Information Report

PREPARED FOR:

Washington State Parks and Recreation Commission
1111 Israel Road SW
PO Box 42650
Tumwater, WA 98505-2650

PROJECT:

Kittitas Depot Historic Preservation
116 Main Street, Unit B
Kittitas, WA 98934
2230784.10

PREPARED BY:

Chris Flyckt, PE
Project Engineer

REVIEWED BY:

Scott T. Kaul, PE, LEED AP
Associate Principal

DATE:

August 2024

08/07/2024

I hereby state that this Stormwater Technical Information Report for the Kittitas Depot Historic Preservation project has been prepared by me or under my supervision and meets the standard of care and expertise that is usual and customary in this community for professional engineers. I understand City of Kittitas does not and will not assume liability for the sufficiency, suitability, or performance of drainage facilities prepared by me.

Table of Contents

Appendices

Appendix A

A1 ..... Basin Map

Appendix B

B1 ..... Water Quality Event Calculations
B2 ..... Flow Control Event Calculations

Appendix C

C1 ..... Geotechnical Report (UNDER SEPARATE COVER)

1.0 Project Overview

1.1 Purpose and Scope

This report accompanies the Permit Set for the Kittitas Depot Historic Preservation project. The proposed project is located at 116 Main Street, Unit B, Kittitas, Washington. The project site is approximately 0.51 acre in size, of which the majority will be proposed as impervious surfacing and located on Parcel 727736 in the Northeast Quarter of Section 11, Township 17, Range 19, Willamette Meridian, in Kittitas, Washington.

The project consists of the restoration the historic Kittitas Depot and associated site improvements, including new paved parking facilities, paved access road, concrete sidewalk, and stormwater facilities.

The proposed onsite stormwater management system will include a bio-infiltration swale for the new paving areas. A detailed description of the onsite stormwater management system is provided in Section 4.0 of this report.

The stormwater design for this project uses the methodology and criteria established by the *Stormwater Management Manual for Eastern Washington (SWMMEW)*, as adopted by City of Kittitas. This report documents that the proposed project complies with the requirements of the *SWMMEW*.

1.2 Existing Conditions

1.2.1 Existing Conditions

The existing conditions of the site consist of the historic Kittitas Depot, a tool shed, various benches and planters, etc. The remainder of the project site is compacted gravel surfacing. The site is bounded to the north by Railroad Avenue and Wilson Park, to the east by Main Street, to the south by a gravel lot, and to the east by a vacant lot.

1.2.2 Topography and Drainage

The existing ground slopes from northeast to southwest in direction. Runoff appears to leave the site as sheet flow. The northern boundary of the site is Railroad Avenue, and a portion of curb and gutter minimizes potential runon to the site. In areas where no curb or gutter exist, runoff from the right-of-way flows to the pervious landscape of Wilson Park.

The site does not contain any defined stormwater improvements.

Figure 1 - NRCS Soil Map

1.2.3 Critical Areas

No critical areas are identified on the site; however, the western portion of the larger overall parcel is identified as an area of potential flood on the FEMA flood map FIRMette Panel. No development is proposed in this area.

1.3 Post-Development Conditions

This project site, as described in Section 1.1, will include an impervious parking area and a concrete platform for the depot. The existing tool shed and depot building will remain.

2.0 Core Elements

2.1 Project Definition and Exemption

Based on the *SWMMEW*, Figure 2.2, Core Elements 1 through 8 are applicable to the project.

2.2 Core Element #1: Preparation of a Stormwater Site Plan

This report and the engineering plans meet the requirement for a Stormwater Site Plan.

2.3 Core Element #2: Construction Stormwater Pollution Prevention

A Construction Stormwater Pollution Prevention Plan (SWPPP) will be included in the final Stormwater Site Plan. The plan will include erosion/sedimentation control features designed to prevent sediment-laden runoff from leaving the site or from adversely affecting critical water resources during construction.

If required, an erosivity waiver will also be included in the final Stormwater Site Plan.

2.4 Core Element #3: Source Control of Pollution

No sources of stormwater pollution are expected to be created as part of this project.

2.5 Core Element #4: Preservation of Natural Drainage Systems

The site does not appear to have a defined drainage system. A bio-infiltration swale is proposed along the southern border of the site. Runoff will either be routed as surface runoff to the swale via sheet flow or the parking lot wedge curb.

2.6 Core Element #5: Runoff Treatment

Basic Treatment: Basic water quality treatment for the project is provided for the site improvements by the bio-infiltration swale (BMP T5.30) located within the site. The bio-infiltration swale is sized using the flow control storm event.

Oil Control: Not Required.

Phosphorus Treatment: Not Required.

Metals Treatment: Not Required.

2.7 Core Element #6: Flow Control

This project is flow control exempt because the site discharges through surface infiltration, which is exempt from flow control per Section 2.7.7 of the *SWMMEW*.

2.8 Core Element #7: Operation and Maintenance

The proposed storm drainage system will be owned, operated, and maintained by Washington State Parks. An Operations and Maintenance Manual (O&M Manual) will be provided to the Washington State Parks and Recreation Commission.

2.9 Core Element #8: Local Requirements

The design meets City of Kittitas standards.

3.0 Offsite Analysis

3.1 Downstream Analysis

The stormwater modeling does not indicate offsite runoff discharge during a 10-year design storm.

3.2 Upstream Analysis

The project area is not subject to the runon of stormwater from offsite.

4.0 Hydrologic Analysis and Design

The water quality (WQ) storm is the Soil Conservation Service (SCS) Type 1A, 24-hour storm with a 6-month return frequency, per Section 2.7.6 of the *SWMMEW*. The total rainfall depth is calculated according to Section 4.3.7 of the *SWMMEW* as the depth of the 2-year, 24-hour storm multiplied by an adjustment coefficient.

According to Table 4.5, C_{WQS} is equal to 0.66 for Region 2.

$$P_{WQS} = C_{WQS} (P_{2yr\text{-}24hr}) = 0.66(0.9) = 0.59 \text{ inches}$$

An SCS Type 1A, 24-hour design storm with a return frequency of 10 years was used for flow control calculations, according to Section 2.7.7 of the *SWMMEW*.

An analysis of the stormwater management system is included in Appendix B, using the design storm depths listed below.

Methodology:	SCS Curve Number		
Rainfall Distribution:	Type 1A 24-Hour		
Rainfall Depth:	6-month	0.59 inch	Water Quality (WQ)
	10-year	1.4 inches	Flow Control

4.1 Existing Site Hydrology

All stormwater runoff from the 10-year design storm will be detained onsite; therefore, existing conditions were not modeled.

4.2 Developed Site Hydrology

The stormwater management system was analyzed with the Autodesk Sanitary Storm Analysis 2023 to determine pond performance during the water quality and flow control events. The developed site consists of one drainage basin tributary to the proposed bio-infiltration swale. A basin map is included in Appendix A. Basin time of concentration is 5 minutes. Project hydrology calculations are included as Appendix B. Proposed basin hydrologic information is provided in the following Table 4-1.

Table 4-1 – Hydrologic Information

Basin	Pavement / Asphalt	Walks/Platform	Lawn / Landscape	Building
A	11,653 sf	2,444 sf	0 sf	2,250 sf

5.0 Treatment Facility Analysis and Design

Basic water quality treatment is provided by a bio-infiltration swale (BMP T5.30). Proposed stormwater facilities will provide treatment of stormwater from new pollution generating impervious surface (PGIS), as required by the *SWMMEW*. PGIS for this project is considered to consist of the existing roof, and concrete and asphalt surfacing. Proposed PGIS will consist of new building rooftop, asphalt pavement, and concrete drives and walks.

Table 5-1 – Bio-Infiltration Attributes

SWALE	WQ Storm Depth (Less than 0.5 ft)	Flow Storm Depth	Draw Down Time (72 hrs Maximum)	Pond Bottom Slope (1% Maximum)	Treatment Soil Depth (6 in Minimum)	Topsoil Infiltration Rate (9 in/hr Maximum)
A	0.03’	0.25’	24 hrs	1.0%	18”	2.4 in/hr

The swale will be connected to the subsurface gravels; therefore, the limiting factor for infiltration will be the amended soils used for the bio-infiltration swale.

5.1 Facility Sizing

The bioswale was sized as one basin; however, in the final stabilized condition, the project site will contain two separate bio-swales. Approximately two-thirds of the site runoff will convey to the east toward the larger bio-swale, while the remaining runoff will convey to the west toward the smaller bio-swale. Sizing is shown in the table below.

Facility ID	Eastern Bio-Swale	Western Bio-Swale
Bio-Swale Bottom Area	330 sf	130 sf
Contributing Area	11,247 sf	5,100 sf

6.0 Flow Control System

The bio-infiltration swale (T5.30) was sized to contain the flow control storm event as an infiltration pond (F6.21). Refer to Table 5.1 for flow control volumes.

7.0 Operations and Maintenance Manual

Private stormwater facilities will be maintained by the owner. An operations and maintenance plan will be prepared under separate cover to assist the owner in their maintenance responsibilities.

The proposed storm drainage system will be owned, operated, and maintained by the Washington State Parks and Recreation Commission. An O&M Manual will be provided to the Washington State Parks and Recreation Commission.

8.0 Conclusion

This project is designed to meet the requirements of the *SWMMEW*.

This analysis is based on data and records either supplied to or obtained by AHBL, Inc. These documents are referenced within the text of the analysis. The analysis has been prepared using procedures and practices within the standard accepted practices of the industry.

AHBL, Inc.

Chris Flyckt, PE
Project Engineer

CLF/lsk

August 2024

Q:\2023\2230784\WORDPROC\Reports\20240807 Rpt (Storm) 2230784.10.docx

Appendix A

Know what's **below.**
Call before you dig.

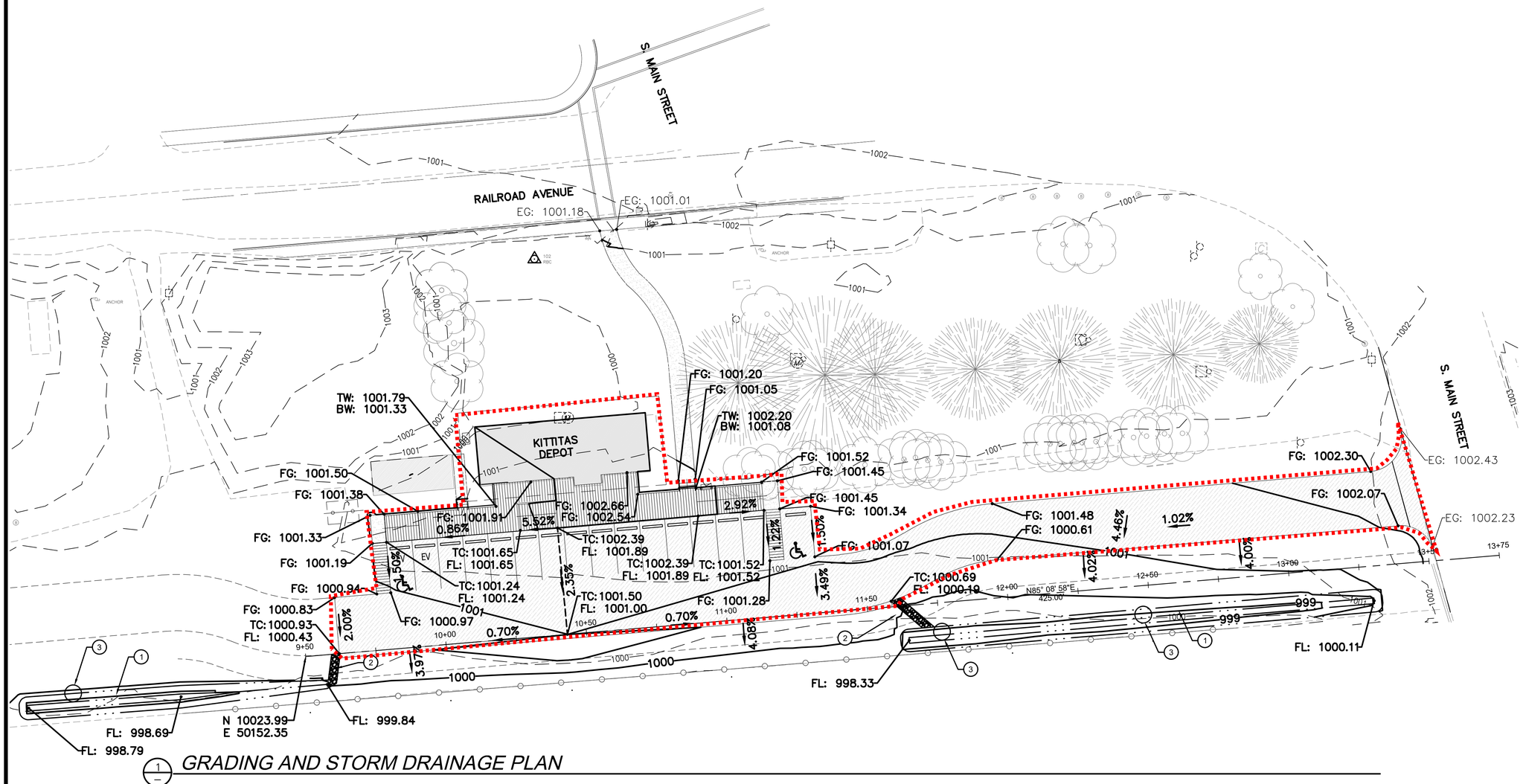
SPOT GRADE KEYNOTES

FG	FINISHED GROUND ELEVATION
FL	FLOWLINE ELEVATION
FF	FINISHED FLOOR ELEVATION
TW	TOP OF WALL ELEVATION
BW	BOTTOM OF WALL ELEVATION

KEYNOTES

1. BIO-INFILTRATION SWALE (1/C303)
   BOTTOM AREA: 440 SF
   BOTTOM EL: 998.69 – 1000.11
   DEPTH: 1 FT
   BOTTOM WIDTH: 2 FT
2. RIP RAP PAD (2/C303)
3. EXCAVATE 5' DIAMETER HOLE DOWN TO EXISTING FREE DRAINING GRAVELS. APPROXIMATELY 5.5' BELOW GRADE SURFACE. WRAP WITH FILTER FABRIC AND BACKFILL WITH DRAIN ROCK TO BOTTOM OF BIOSWALE SOILS.

20'
0 40'



1 GRADING AND STORM DRAINAGE PLAN

SHEET 4 OF 8

CAD NO.

NO.	REVISIONS	INT.	APP.	DATE

ACTION	BY	DATE
DESIGNED	CF	
DRAWN	TS	
CHECKED (FIELD)	SK	
CHECKED (HDQTS.)		

SCOTT T. KAUL
STATE OF WASHINGTON
46972
REGISTERED
PROFESSIONAL ENGINEER

NOTICE:
ALTERATION OF THIS DOCUMENT SHALL INVALIDATE THE PROFESSIONAL SEAL AND SIGNATURE. PUBLICATION OF THIS DOCUMENT DOES NOT DEROGATE FROM RESERVED OWNERSHIP RIGHTS IN IT. THIS DOCUMENT IS FOR USE ONLY FOR THE PROJECT IDENTIFIED IN THE TITLE BLOCK AND IS NOT TO BE USED FOR REPAIR, REMODEL OR ADDITION TO THAT PROJECT OR FOR ANY OTHER PROJECT.

REGISTERED STAMP

WASHINGTON STATE PARKS AND RECREATION COMMISSION

KITTITAS DEPOT HISTORIC PRESERVATION

GRADING AND STORM DRAINAGE PLAN

C-301

SCALE
AS SHOWN

PARKS FILE# I500-6619-2024

DATE: August 1, 2024 FILENAME: Q:\2023\2230784\10_CIV\CAD\2230784-GRAD-STRM.dwg

Appendix B

Project Description

File Name	Kitittas Bio Swale.SPF

Project Options

Flow Units	CFS
Elevation Type	Elevation
Hydrology Method	SCS TR-20
Time of Concentration (TOC) Method	User-Defined
Link Routing Method	Kinematic Wave
Enable Overflow Ponding at Nodes	YES
Skip Steady State Analysis Time Periods	YES

Analysis Options

Start Analysis On	00:00:00	0:00:00
End Analysis On	00:00:00	0:00:00
Start Reporting On	00:00:00	0:00:00
Antecedent Dry Days	0	days
Runoff (Dry Weather) Time Step	0 01:00:00	days hh:mm:ss
Runoff (Wet Weather) Time Step	0 00:05:00	days hh:mm:ss
Reporting Time Step	0 00:05:00	days hh:mm:ss
Routing Time Step	30	seconds

Number of Elements

	Qty
Rain Gages	1
Subbasins	1
Nodes	2
Junctions	0
Outfalls	1
Flow Diversions	0
Inlets	0
Storage Nodes	1
Links	1
Channels	0
Pipes	1
Pumps	0
Orifices	0
Weirs	0
Outlets	0
Pollutants	0
Land Uses	0

Rainfall Details

SN	Rain Gage ID	Data Source	Data Source ID	Rainfall Type	Rain Units	State	County	Return Period (years)	Rainfall Depth (inches)	Rainfall Distribution
49		Time Series	6-Month 24-Hr WQ	Cumulative	inches	Washington	Kittitas	2.00	0.59	SCS Type IA 24-hr

Subbasin Summary

SN	Subbasin ID	Area (ft^2)	Peak Rate Factor	Weighted Curve Number	Total Rainfall (in)	Total Runoff (in)	Total Runoff Volume (ac-in)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
1	Sub-01	16347.00	484.00	98.00	0.59	0.40	0.15	0.04	0 00:05:00

Node Summary

SN	Element ID	Element Type	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Initial Water Elevation (ft)	Surcharge Elevation (ft)	Ponded Area (ft^2)	Peak Inflow (cfs)	Max HGL Elevation Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	Bioswale_out	Outfall	0.00					0.00	0.00					
2	BioSwale	Storage Node	0.00	1.00	0.00		0.00	0.04	0.03				0.00	0.00

Link Summary

SN	Element ID	Element Type	From (Inlet) Node	To (Outlet) Node	Length	Inlet Invert Elevation	Outlet Invert Elevation	Average Slope	Diameter or Height	Manning's Roughness	Peak Flow	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity	Peak Flow Depth	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged	Reported Condition
					(ft)	(ft)	(ft)	(%)	(in)		(cfs)	(cfs)		(ft/sec)	(ft)		(min)	
1	Link-01	Pipe	BioSwale	Bioswale_out	624.42	0.00	0.00	0.0000	0.000	0.0150	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

Subbasin Hydrology

Subbasin : Sub-01

Input Data

Area (ft²)	16347
Peak Rate Factor	484
Weighted Curve Number	98
Rain Gage ID	Kittitas_SD

Composite Curve Number

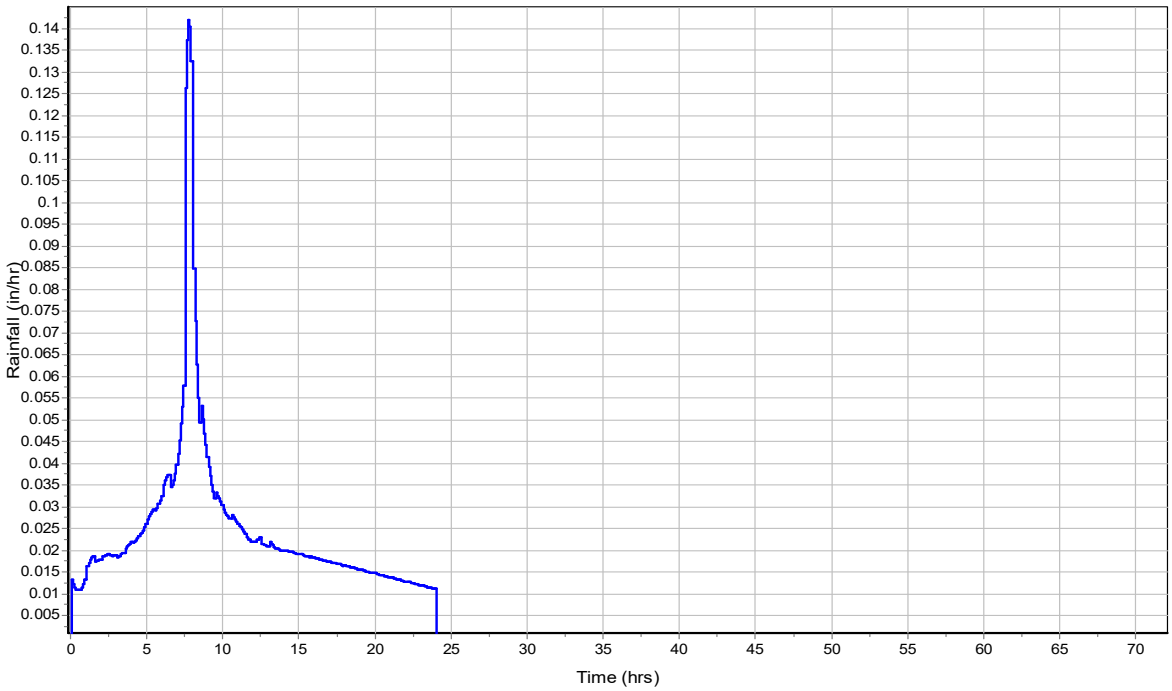
32	Area	Soil	Curve
Soil/Surface Description	(ft²)	Group	Number
-	16346.98	-	98
Composite Area & Weighted CN	16346.98		98

Subbasin Runoff Results

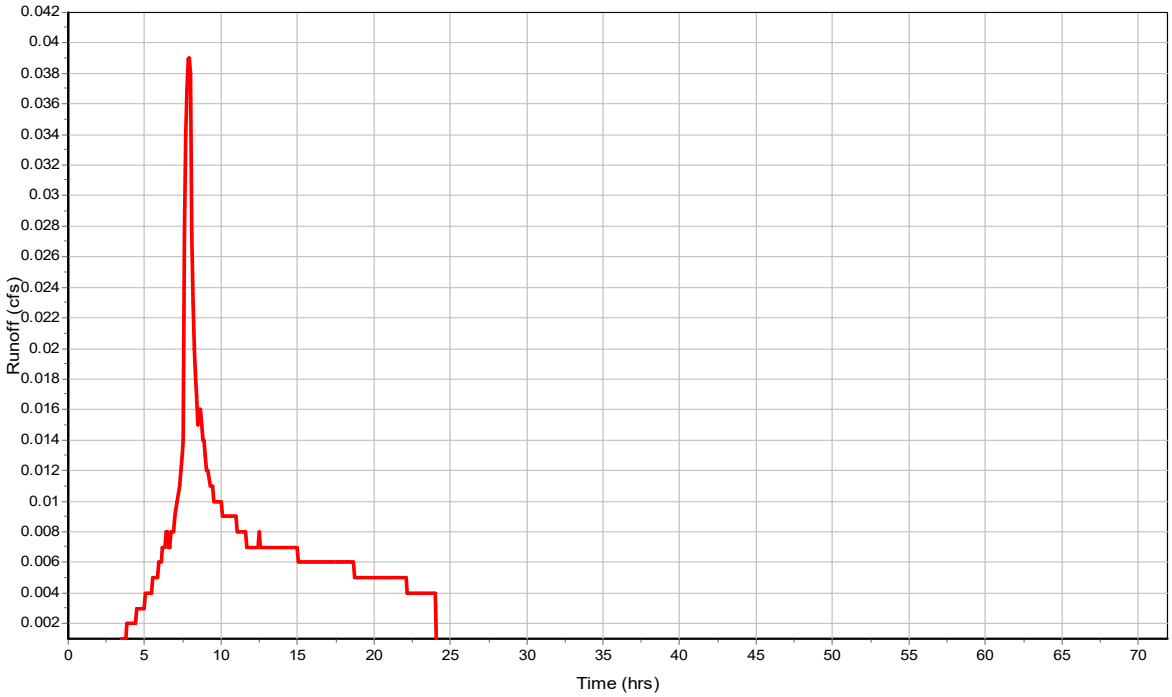
Total Rainfall (in)	0.59
Total Runoff (in)	0.4
Peak Runoff (cfs)	0.04
Weighted Curve Number	98
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : Sub-01

Rainfall Intensity Graph



Runoff Hydrograph



Pipe Input

SN	Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Slope (%)	Pipe Shape	Pipe Diameter or Height (in)	Pipe Width (in)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow (cfs)	Flap Gate	No. of Barrels
1	Link-01	624.42	0.00	0.00	0.00	0.00	0.00	0.0000	Dummy	0.000	0.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1

Pipe Results

SN	Element ID	Peak Flow	Time of Peak Flow Occurrence	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity	Travel Time	Peak Flow Depth	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged	Froude Number	Reported Condition
		(cfs)	(days hh:mm)	(cfs)		(ft/sec)	(min)	(ft)		(min)		
1	Link-01	0.00	0 00:00	0.00	0.00	0.00		0.00	0.00	0.00		

Storage Nodes

Storage Node : BioSwale

Input Data

Invert Elevation (ft)	0.00
Max (Rim) Elevation (ft)	1.00
Max (Rim) Offset (ft)	1.00
Initial Water Elevation (ft)	0.00
Initial Water Depth (ft)	0.00
Ponded Area (ft^2)	0.00
Evaporation Loss	0.00

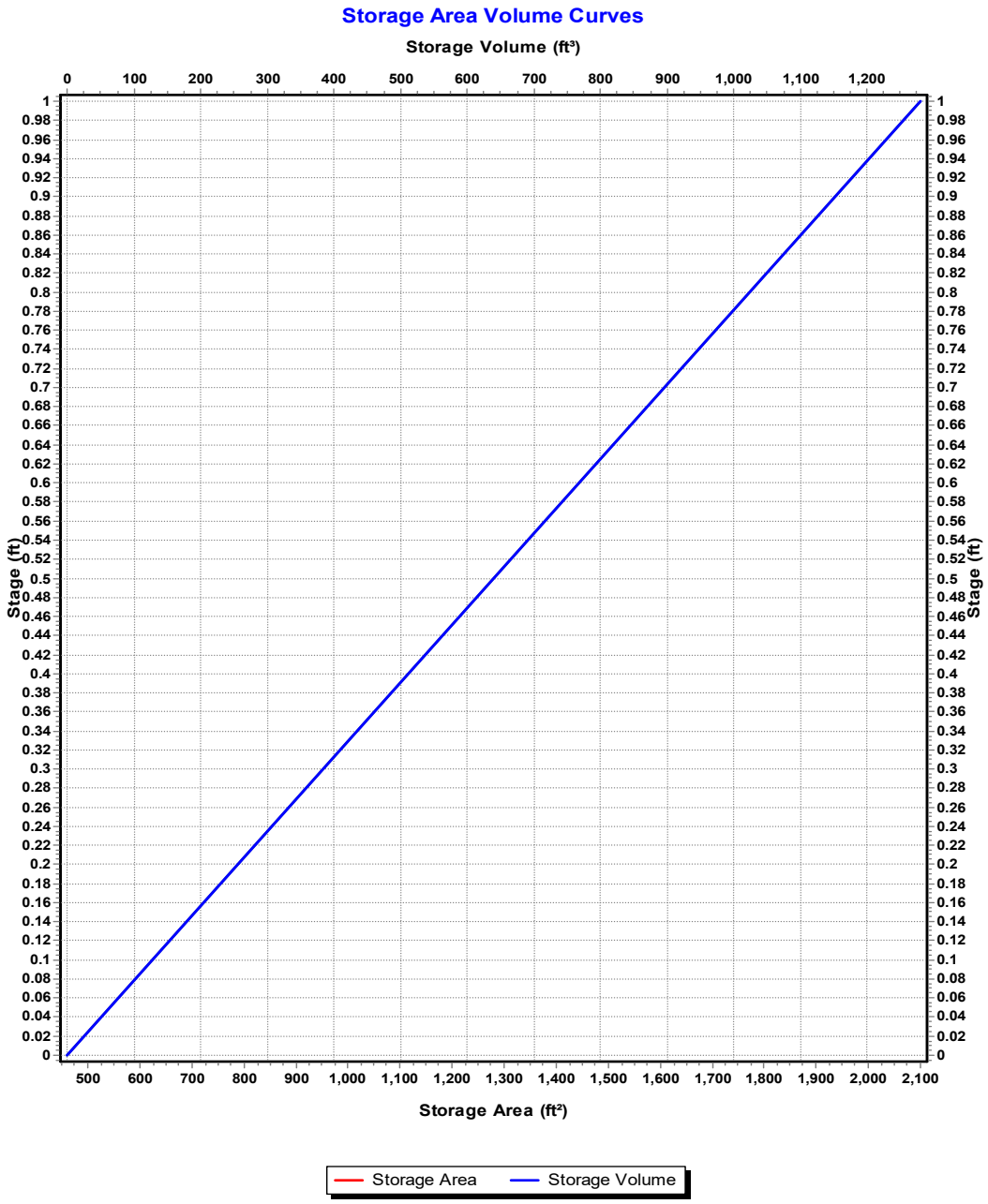
Infiltration/Exfiltration

Exfiltration Rate (in/hr)	2.4

Storage Area Volume Curves

Storage Curve : Bioswale

Stage (ft)	Storage Area (ft^2)	Storage Volume (ft^3)
0	460	0
1	2100	1280


Storage Area Volume Curves
Storage Volume (ft³)
0
100
200
300
400
500
600
700
800
900
1,000
1,100
1,200
Stage (ft)
1
0.98
0.96
0.94
0.92
0.9
0.88
0.86
0.84
0.82
0.8
0.78
0.76
0.74
0.72
0.7
0.68
0.66
0.64
0.62
0.6
0.58
0.56
0.54
0.52
0.5
0.48
0.46
0.44
0.42
0.4
0.38
0.36
0.34
0.32
0.3
0.28
0.26
0.24
0.22
0.2
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
500
600
700
800
900
1,000
1,100
1,200
1,300
1,400
1,500
1,600
1,700
1,800
1,900
2,000
2,100
Storage Area (ft²)
Storage Area
Storage Volume

Storage Node : BioSwale (continued)

Output Summary Results

Peak Inflow (cfs)	0.04
Peak Lateral Inflow (cfs)	0.04
Peak Outflow (cfs)	0
Peak Exfiltration Flow Rate (cfm)	1.71
Max HGL Elevation Attained (ft)	0.03
Max HGL Depth Attained (ft)	0.03
Average HGL Elevation Attained (ft)	0
Average HGL Depth Attained (ft)	0
Time of Max HGL Occurrence (days hh:mm)	0 08:10
Total Exfiltration Volume (1000-ft^3)	0.106
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0

Project Description

File Name	Kitittas Bio Swale.SPF

Project Options

Flow Units	CFS
Elevation Type	Elevation
Hydrology Method	SCS TR-20
Time of Concentration (TOC) Method	User-Defined
Link Routing Method	Kinematic Wave
Enable Overflow Ponding at Nodes	YES
Skip Steady State Analysis Time Periods	YES

Analysis Options

Start Analysis On	00:00:00	0:00:00
End Analysis On	00:00:00	0:00:00
Start Reporting On	00:00:00	0:00:00
Antecedent Dry Days	0	days
Runoff (Dry Weather) Time Step	0 01:00:00	days hh:mm:ss
Runoff (Wet Weather) Time Step	0 00:05:00	days hh:mm:ss
Reporting Time Step	0 00:05:00	days hh:mm:ss
Routing Time Step	30	seconds

Number of Elements

	Qty
Rain Gages	1
Subbasins	1
Nodes	2
Junctions	0
Outfalls	1
Flow Diversions	0
Inlets	0
Storage Nodes	1
Links	1
Channels	0
Pipes	1
Pumps	0
Orifices	0
Weirs	0
Outlets	0
Pollutants	0
Land Uses	0

Rainfall Details

SN	Rain Gage ID	Data Source	Data Source ID	Rainfall Type	Rain Units	State	County	Return Period (years)	Rainfall Depth (inches)	Rainfall Distribution
49		Time Series	10-Year 25-Hr FC	Cumulative	inches	Washington	Kittitas	10.00	1.40	SCS Type IA 24-hr

Subbasin Summary

SN	Subbasin ID	Area (ft^2)	Peak Rate Factor	Weighted Curve Number	Total Rainfall (in)	Total Runoff (in)	Total Runoff Volume (ac-in)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
1	Sub-01	16347.00	484.00	98.00	1.40	1.18	0.44	0.12	0 00:05:00

Node Summary

SN	Element ID	Element Type	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Initial Water Elevation (ft)	Surcharge Elevation (ft)	Ponded Area (ft^2)	Peak Inflow (cfs)	Max HGL Elevation Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	Bioswale_out	Outfall	0.00					0.00	0.00					
2	BioSwale	Storage Node	0.00	1.00	0.00		0.00	0.12	0.25				0.00	0.00

Link Summary

SN	Element ID	Element Type	From (Inlet) Node	To (Outlet) Node	Length	Inlet Invert Elevation	Outlet Invert Elevation	Average Slope	Diameter or Height	Manning's Roughness	Peak Flow	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity	Peak Flow Depth	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged	Reported Condition
					(ft)	(ft)	(ft)	(%)	(in)		(cfs)	(cfs)		(ft/sec)	(ft)		(min)	
1	Link-01	Pipe	BioSwale	Bioswale_out	624.42	0.00	0.00	0.0000	0.000	0.0150	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

Subbasin Hydrology

Subbasin : Sub-01

Input Data

Area (ft²)	16347
Peak Rate Factor	484
Weighted Curve Number	98
Rain Gage ID	Kittitas_SD

Composite Curve Number

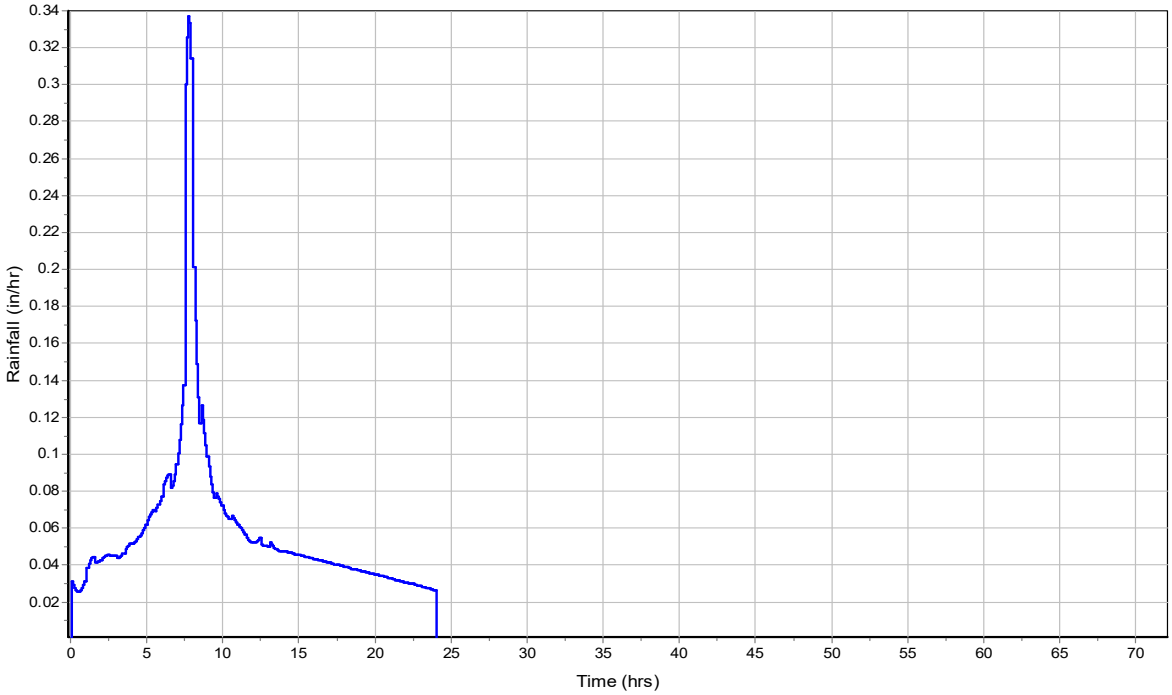
32 Soil/Surface Description	Area (ft²)	Soil Group	Curve Number
-	16346.98	-	98
Composite Area & Weighted CN	16346.98		98

Subbasin Runoff Results

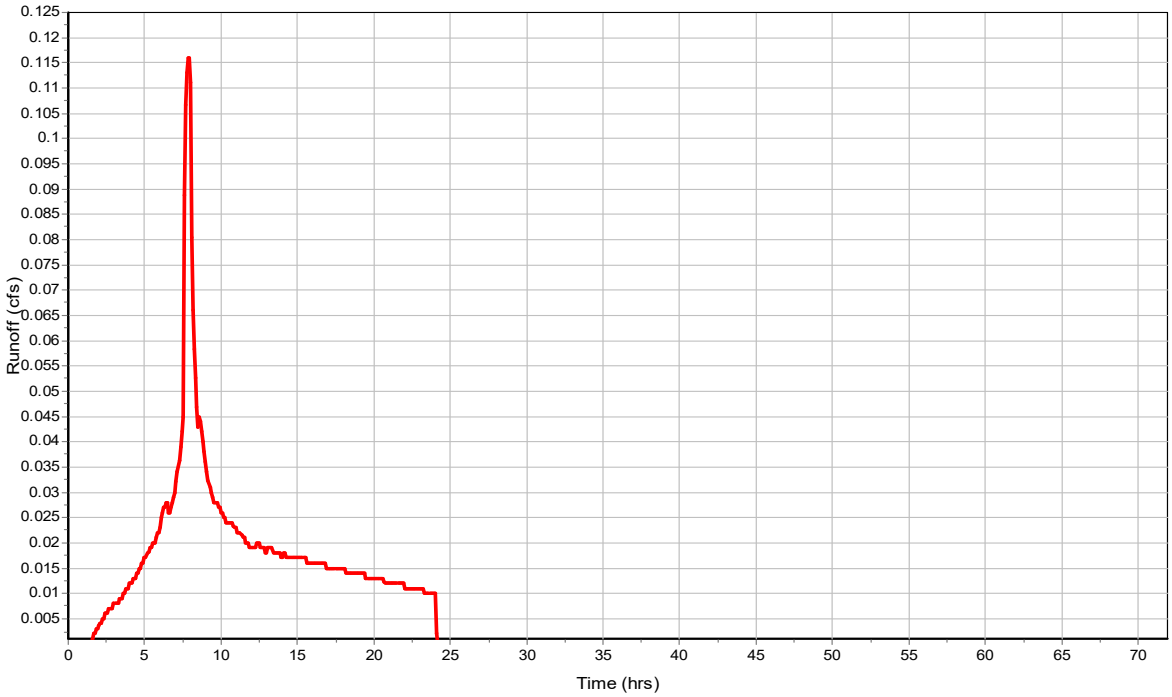
Total Rainfall (in)	1.4
Total Runoff (in)	1.18
Peak Runoff (cfs)	0.12
Weighted Curve Number	98
Time of Concentration (days hh:mm:ss)	0 00:05:00

Subbasin : Sub-01

Rainfall Intensity Graph



Runoff Hydrograph



Pipe Input

SN	Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Slope (%)	Pipe Shape	Pipe Diameter or Height (in)	Pipe Width (in)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow (cfs)	Flap Gate	No. of Barrels
1	Link-01	624.42	0.00	0.00	0.00	0.00	0.00	0.0000	Dummy	0.000	0.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1

Pipe Results

SN	Element ID	Peak Flow	Time of Peak Flow Occurrence	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity	Travel Time	Peak Flow Depth	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged	Froude Number	Reported Condition
		(cfs)	(days hh:mm)	(cfs)		(ft/sec)	(min)	(ft)		(min)		
1	Link-01	0.00	0 00:00	0.00	0.00	0.00		0.00	0.00	0.00		

Storage Nodes

Storage Node : BioSwale

Input Data

Invert Elevation (ft)	0.00
Max (Rim) Elevation (ft)	1.00
Max (Rim) Offset (ft)	1.00
Initial Water Elevation (ft)	0.00
Initial Water Depth (ft)	0.00
Ponded Area (ft^2)	0.00
Evaporation Loss	0.00

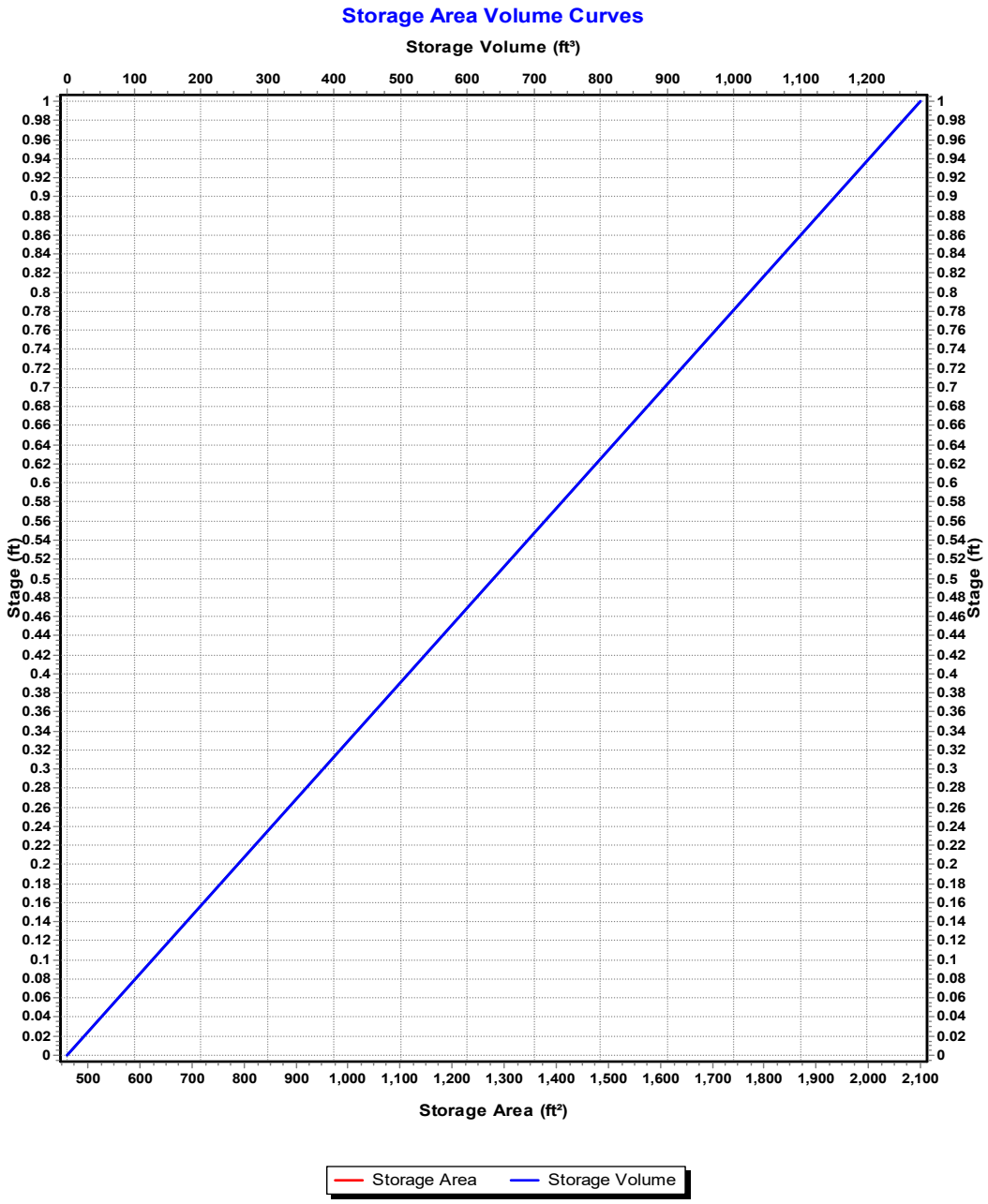
Infiltration/Exfiltration

Exfiltration Rate (in/hr)	2.4

Storage Area Volume Curves

Storage Curve : Bioswale

Stage (ft)	Storage Area (ft^2)	Storage Volume (ft^3)
0	460	0
1	2100	1280


Storage Area Volume Curves
Storage Volume (ft³)
0
100
200
300
400
500
600
700
800
900
1,000
1,100
1,200
Stage (ft)
1
0.98
0.96
0.94
0.92
0.9
0.88
0.86
0.84
0.82
0.8
0.78
0.76
0.74
0.72
0.7
0.68
0.66
0.64
0.62
0.6
0.58
0.56
0.54
0.52
0.5
0.48
0.46
0.44
0.42
0.4
0.38
0.36
0.34
0.32
0.3
0.28
0.26
0.24
0.22
0.2
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
500
600
700
800
900
1,000
1,100
1,200
1,300
1,400
1,500
1,600
1,700
1,800
1,900
2,000
2,100
Storage Area (ft²)
Storage Area
Storage Volume

Storage Node : BioSwale (continued)

Output Summary Results

Peak Inflow (cfs)	0.12
Peak Lateral Inflow (cfs)	0.12
Peak Outflow (cfs)	0
Peak Exfiltration Flow Rate (cfm)	2.92
Max HGL Elevation Attained (ft)	0.25
Max HGL Depth Attained (ft)	0.25
Average HGL Elevation Attained (ft)	0.01
Average HGL Depth Attained (ft)	0.01
Time of Max HGL Occurrence (days hh:mm)	0 08:29
Total Exfiltration Volume (1000-ft^3)	0.833
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0

Appendix C

C1 .....Geotechnical Report (UNDER SEPARATE COVER)

Construction Stormwater Pollution Prevention Plan

PREPARED FOR:

Washington State Parks and Recreation Commission
1111 Israel Road SW
PO Box 42650
Tumwater, WA 98505-2650

PROJECT:

Kittitas Depot Historic Preservation
116 Main Street, Unit B
Kittitas, WA 98934
2230784.10

PREPARED BY:

Chris Flyckt, PE
Project Engineer

REVIEWED BY:

Scott T. Kaul, PE, LEED AP
Associate Principal

DATE

August 2024

Construction Stormwater Pollution Prevention Plan

PREPARED FOR:

Washington State Parks and Recreation Commission
1111 Israel Road SW
PO Box 42650
Tumwater, WA 98505-2650

PROJECT:

Kittitas Depot Historic Preservation
116 Main Street, Unit B
Kittitas, WA 98934
2230784.10

PREPARED BY:

Chris Flyckt, PE
Project Engineer

REVIEWED BY:

Scott T. Kaul, PE, LEED AP
Associate Principal

DATE:

August 2024

08/08/2024

I hereby state that this Construction Stormwater Pollution Prevention Plan for Kittitas Depot Historic Preservation project has been prepared by me or under my supervision and meets the standard of care and expertise that is usual and customary in this community for professional engineers. I understand that City of Kittitas does not and will not assume liability for the sufficiency, suitability, or performance of drainage facilities prepared by me.

Table of Contents

Exhibits

Exhibit 1

Inspection Logs

Exhibit 2

Selected Best Management Practices (BMPs)

Exhibit 3

TESC Plans

1.0 Introduction

In 1972, Congress passed the Federal Water Pollution Control Act (FWPCA), also known as the Clean Water Act (CWA), to restore and maintain the quality of the nation's waterways. The ultimate goal was to ensure rivers and streams were fishable, swimmable, and drinkable. In 1987, the Water Quality Act (WQA) added provisions to the CWA that allowed the Environmental Protection Agency (EPA) to govern stormwater discharges from construction sites. The National Pollutant Discharge Elimination System (NPDES) General Permit includes provisions for development of a Stormwater Pollution Prevention Plan (SWPPP) to maximize the potential benefits of pollution prevention and sediment and erosion control measures at construction sites.

The proposed project will disturb more than 1 acre of area, and therefore is required to obtain an NPDES General Permit for Stormwater Associated with Construction Activities.

The 2019 Washington State Department of Ecology (DOE) *Stormwater Management Manual for Eastern Washington (SWMMEW)* requires a Construction Stormwater Pollution Prevention Plan (CSWPPP) for projects that add or replace more than 2,000 square feet of impervious surface. The proposed project will exceed this threshold; therefore, a CSWPPP is required.

Development, implementation, and maintenance of the CSWPPP will provide the selected General Contractor with the framework for reducing soil erosion and minimizing pollutants in stormwater during construction. The CSWPPP will:

- Define the characteristics of the site and the type of construction that will occur.
- Describe the practices that will be implemented to control erosion and the release of pollutants in stormwater.
- Create an implementation schedule to ensure that the practices described in this CSWPPP are in fact implemented, and to evaluate the plan's effectiveness in reducing erosion, sediment, and pollutant levels in stormwater discharged from the site.
- Describe the final stabilization/termination design to minimize erosion and prevent stormwater impacts after construction is complete.

This CSWPPP:

- Identifies the Certified Erosion and Sedimentation Control Lead (CESCL) with a description of this person's duties.
- Identifies the Stormwater Pollution Prevention Team (SWPP Team) that will assist in implementation of the CSWPPP during construction.
- Describes the existing site conditions, including existing land use, soil types at the site, and the location of surface waters that are located on or next to the site.
- Identifies the body or bodies of water that will receive runoff from the construction site, including the ultimate body of water that receives the stormwater.
- Identifies the drainage areas and potential stormwater contaminants.
- Describes the stormwater management controls and various Best Management Practices (BMPs) necessary to reduce erosion, sediment, and pollutants in stormwater discharge.
- Describes the facility monitoring plan and how controls will be coordinated with construction activities.
- Describes the implementation schedule and provisions for amendment of the plan.

2.0 Project Description

2.1 Site Location

This report accompanies the civil engineering plans and documents for the Kittitas Depot Historic Preservation project located in the City of Kittitas, Kittitas County, Washington.

The project site is approximately 0.51 acre in size, of which the majority will be proposed as impervious surfacing and located on Parcel 727736 in the Northeast Quarter of Section 11, Township 17, Range 19, Willamette Meridian, in Kittitas, Washington.

2.2 Proposed Construction Activities

The project consists of the restoration the historic Kittitas Depot and associated site improvements, including new paved parking facilities, paved access road, concrete sidewalk, and stormwater facilities. The proposed onsite stormwater management system will include a bio-infiltration swale for the new paved areas.

3.0 Existing Site Conditions

3.1 Existing Cover

The existing conditions of the site consist of the historic Kittitas Depot, a tool shed, and various benches, planters, etc. The remainder of the project site is compacted gravel surfacing. The site is bounded to the north by Railroad Avenue and Wilson Park, to the east by Main Street, to the south by a gravel lot, and to the east by a vacant lot.

3.2 Topography and Drainage

The existing ground slopes from northeast to southwest in direction. The northern boundary of the site is Railroad Avenue, and a portion of curb and gutter minimizes potential runon to the site. In areas where no curb or gutter exist, runoff from the right-of-way flows to the pervious landscape of Wilson Park.

The site does not contain any defined stormwater improvements.

4.0 Adjacent Areas and Drainage

Significant runoff from adjacent properties is not expected to enter the project site. To our knowledge, there are no existing or anticipated impacts to the downstream basin area.

5.0 Critical Areas

No critical areas are identified on the site; however, the western portion of the larger overall parcel is identified as an area of potential flood on the FEMA flood map FIRMette Panel. No development is proposed in this area.

6.0 Soils

The Natural Resources Conservation Service (NRCS) Web Soil Survey identifies the onsite soils as Opnish ashy loam, 0 to 2 percent slopes. The parent material consists of alluvium with an influence of volcanic ash in the upper part. Depth to restrictive feature is greater than 80 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately high. Available water to depth of 60 inches is high. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Nonirrigated land capability classification is 3w. This soil does not meet hydric criteria.

7.0 Potential Erosion Problems

No known historical erosion problems are located on the site. No known potential erosion problems will be created onsite.

8.0 Construction Stormwater Pollution Prevention Elements

The purpose of this section is to describe how each of the 13 Construction Stormwater Pollution Prevention elements has been addressed and to identify the type and location of BMPs used to satisfy the required element. If an element is not applicable to the project, a reason is provided.

8.1 Preserve Vegetation / Mark Clearing Limits

Prior to beginning land-disturbing activities, clearing limits will be marked with high visibility plastic or metal fence (BMP C103). Significant vegetation to remain will be marked and protected by fencing.

Installation Schedule: To be developed by the contractor prior to start of field work.

Inspection and Maintenance Plan: To be developed by contractor. At a minimum, inspection is required every seven days or within 24 hours of any discharge from the site.

Responsible Staff: To be determined by contractor.

8.2 Establish Construction Access

A stabilized construction entrance shall be constructed after installing perimeter silt fence. The construction entrance shall be placed in the vicinity of the proposed connection to Main Street (BMP C105). If sediment tracking should occur, the Contractor will be required to sweep the impacted roadways. Dump trucks hauling material to and from the site will be covered by a tarp.

Installation Schedule: To be developed by the contractor prior to start of field work.

Inspection and Maintenance Plan: To be developed by contractor.

Responsible Staff: To be determined by contractor.

8.3 Control Flow Rates

Because of the small size of the disturbed site perimeter, silt fence will be adequate to control flow rates.

Installation Schedule: To be developed by the contractor prior to start of field work.

Inspection and Maintenance Plan: To be developed by contractor. At a minimum, contractor will be responsible to inspect silt fencing and remove sediment deposits when they reach one-third the height of the fence.

Responsible Staff: To be determined by contractor.

8.4 Install Sediment Controls

As part of the initial construction activities, BMPs will be installed to trap sediment onsite. The identified BMP is silt fencing (BMP C233), which will be constructed prior to the start of any clearing or grading activities.

Installation Schedule: To be developed by the contractor prior to start of field work.

Inspection and Maintenance Plan: To be developed by contractor. At a minimum, contractor will be responsible to inspect silt fencing and remove sediment deposits when they reach one-third the height of the fence.

Responsible Staff: To be determined by contractor.

8.5 Stabilize Soils

To protect soil from the erosive forces of raindrops, flowing water, and wind, the following BMPs will be implemented within 15 or 30 days of soil being exposed:

- All disturbed areas that will remain unworked will be stabilized with mulch (BMP C121) within 15 days (October 1 through June 30) or 30 days (July 1 through September 30).
- After stabilization, all areas that will not be impacted by construction will be seeded (BMP C120).
- Topsoil stockpiles will be stabilized with plastic coverings (BMP C123).
- Dust control (BMP C140) will be provided by sprinkling the site with water.
- Permanent erosion control measures will include site paving and seeding of exposed soils.

Installation Schedule: To be developed by the contractor prior to start of field work.

Inspection and Maintenance Plan: To be developed by contractor.

Responsible Staff: To be determined by contractor.

8.6 Protect Slopes

Slopes on the site will be protected to minimize erosion. Temporary and permanent seeding (BMP C120) will be used to reduce erosion of exposed soils on slopes. Runoff collection methods include temporary interceptor swales (BMP C200).

Installation Schedule: To be developed by the contractor prior to start of field work.

Inspection and Maintenance Plan: To be developed by contractor.

Responsible Staff: To be determined by contractor.

8.7 Protect Drain Inlets

Proposed drain inlets shall be protected until final site stabilization. Any storm drain inlets downstream shall be protected so that surface water runoff does not enter the conveyance system without first being filtered.

Installation Schedule: To be developed by the contractor prior to start of field work.

Inspection and Maintenance Plan: To be developed by contractor. Inlets shall be inspected weekly, at a minimum, and daily during storm events. Storm Drain Inlet Protection (BMP C220) will be provided.

Responsible Staff: To be determined by contractor.

8.8 Stabilize Channels and Outlets

Contractor will provide stabilization, including armoring material, adequate to prevent erosion of outlets, adjacent stream banks, slopes, and downstream reaches, which will be installed at the outlets of all conveyance systems.

Installation Schedule: To be developed by the contractor prior to start of field work.

Inspection and Maintenance Plan: To be developed by contractor.

Responsible Staff: To be determined by contractor.

8.9 Control Pollutants

All waste materials will be collected and stored in a securely closed metal dumpster. All trash and construction debris from the site will be deposited in the dumpster. The dumpster will be emptied a minimum of once per week, and the trash will be hauled to the local landfill. No construction materials will be buried onsite. All personnel will be instructed regarding the correct procedure for waste disposal. All sanitary waste will be collected from the portable units a minimum of three times per week. Good housekeeping and spill control practices will be followed during construction to minimize stormwater contamination from petroleum products, fertilizers, and concrete.

Cover, containment, and protection from vandalism shall be provided for all chemicals, liquid products, petroleum products, and non-inert wastes present on the site (see Chapter 173-304 WAC for the definition of inert waste). Onsite fueling tanks shall include secondary containment.

Maintenance and repair of heavy equipment and vehicles involving oil changes, hydraulic system drain down, solvent and degreasing cleaning operations, fuel tank drain down and removal, and other activities that may result in discharge or spillage of pollutants to the ground or into stormwater runoff will not be permitted.

The following BMPs shall be used to prevent or treat contamination of stormwater runoff by pH modifying sources. These sources include, but are not limited to, bulk cement, cement kiln dust, fly ash, new concrete washing and curing waters, waste streams generated from concrete grinding and sawing, exposed aggregate processes, and concrete pumping and mixer washout waters. Stormwater discharges shall not cause or contribute to a violation of the water quality standard for pH in the receiving water.

- BMP C151, Concrete Handling, shall be used to minimize and eliminate concrete, concrete process water, and concrete slurry from contaminating runoff.
- BMP C152, Sawcutting and Surfacing Pollution Prevention, shall be used to ensure water that contains fine particles and high pH from sawcutting and surfacing operations does not contaminate runoff.
- BMP C153, Material Delivery, Storage, and Containment, shall be used to prevent, reduce, or eliminate the discharge of pollutants to stormwater runoff.
- BMP C154, Concrete Washout area, shall be used to prevent concrete waste from contaminating stormwater.

Table 1 below lists several pollutants that are commonly found on construction sites that have the potential to contaminate storm runoff. These pollutants will be present, mainly in areas of building and pavement construction. The Contractor and the CESCL will be responsible for identifying areas where these pollutants are being used and monitor runoff coming from these areas. Pollutant sources will be covered with plastic if contaminated runoff is observed from these areas. If contaminated runoff is found in the sediment trap or soils, the CESCL will direct the Contractor to remove the polluted water/soil and dispose of it in an approved area offsite.

Table 1 – Potential Construction Site Stormwater Pollutants

Trade Name Material	Chemical/Physical Description [(1)]	Stormwater Pollutants [(1)]
Pesticides (insecticides, fungicides, herbicide, rodenticides)	Various colored to colorless liquid, powder, pellets, or grains	Chlorinated hydrocarbons, organophosphates, carbamates, arsenic
Fertilizer	Liquid or solid grains	Nitrogen, phosphorous
Plaster	White granules or powder	Calcium sulphate, calcium carbonate, sulfuric acid
Cleaning solvents	Colorless, blue, or yellow-green liquid	Perchloroethylene, methylene chloride, trichloroethylene, petroleum distillates
Asphalt	Black solid	Oil, petroleum distillates
Concrete	White solid	Limestone, sand
Glue, adhesives	White or yellow liquid	Polymers, epoxies
Paints	Various colored liquid	Metal oxides, Stoddard solvent, talc, calcium carbonate, arsenic
Curing compounds	Creamy white liquid	Naphtha
Wastewater from construction equipment washing	Water	Soil, oil & grease, solids
Wood preservatives	Clear amber or dark brown liquid	Stoddard solvent, petroleum distillates, arsenic, copper, chromium
Hydraulic oil/fluids	Brown oily petroleum hydrocarbon	Mineral oil
Gasoline	Colorless, pale brown or pink petroleum hydrocarbon	Benzene, ethyl benzene, toluene, xylene, MTBE
Diesel fuel	Clear, blue-green to yellow liquid	Petroleum distillate, oil & grease, naphthalene, xylenes
Kerosene	Pale yellow liquid petroleum hydrocarbon	Coal oil, petroleum distillates
Antifreeze/coolant	Clear green/yellow liquid	Ethylene glycol, propylene glycol, heavy metals (copper, lead, zinc)
Erosion	Solid Particles	Soil, Sediment

[(1)] Data obtained from MSDS when available

Installation Schedule: To be developed by the contractor prior to start of field work.

Inspection and Maintenance Plan: To be developed by contractor.

Responsible Staff: To be determined by contractor.

8.9.1 Required BMPs

The following BMPs or equivalent measures are required of all businesses and agencies during concrete pouring and asphalt application at temporary sites:

- Employees must be educated on the pollution hazards of concrete and asphalt application and cutting.
- Loose aggregate chunks and dust must be swept or shoveled and collected (not hosed down a storm drain) for recycling or proper disposal at the end of each workday, especially at work sites such as streets, driveways, parking lots, sidewalks, curbs, and gutters where rain can readily pick up the loose material and carry it to the nearest stormwater conveyance. Small amounts of excess concrete, grout, and mortar can be disposed of in the trash.
- Storm drain covers or similarly effective containment devices must be placed over all nearby drains at the beginning of each day. Shovel or vacuum slurry and remove from the site. All accumulated runoff and solids must be collected and properly disposed at the end of each workday, or more often if necessary.
- Exposed aggregate washing, where the top layer of unhardened concrete is hosed or scraped off to leave a rough finish, must be done with a mechanism for containment and collection of the discarded concrete slurry (such as the storm drain covers mentioned above). The easiest way to contain the wash water will be to direct the washings to a hole in the ground where the water can percolate into the ground and the solids later covered with soil.
- If directed to a drain, a catch basin filter insert must be used to remove the solids. This is especially useful if the activity must proceed on rainy days.
- Cleaning of concrete application and mixing equipment or concrete vehicles on the work site must be done in a designated area where the rinse water is controlled. The rinse water must either be collected for proper disposal or put into a hole in the ground where the water can percolate away and the solids later covered with soil or recovered and disposed or recycled.

The use of any treatment BMP must not result in the violation of groundwater, surface water, or drinking water quality standards.

8.10 Control Dewatering

Dewatering is not anticipated for this site. If required, dewatering discharge shall be directed to a sediment trapping facility (BMP C240) prior to infiltration.

Installation Schedule: To be developed by the contractor prior to start of field work.

Inspection and Maintenance Plan: To be developed by contractor.

Responsible Staff: To be determined by contractor.

8.11 Maintain BMPs

Temporary and permanent erosion and sediment control BMPs shall be maintained and repaired as needed to assure performance of their intended functions.

Sediment control BMPs such as silt fencing, slope blankets, and drain inlet protection shall be inspected weekly or after a runoff-producing event. Temporary erosion and sediment control

BMPs will be removed within 30 days after final site stabilization is achieved. The following inspection and maintenance practices will be used to maintain erosion and sediment controls:

- Built-up sediment will be removed from silt fencing when it has reached one-third the height of the fence.
- Silt fences will be inspected for depth of sediment, tears in the fabric, and attachment to the fence posts, and to ensure fence posts are firmly in the ground. Accumulated sediment will be removed from behind the fence.
- Check dams will be inspected for depth of sediment. Accumulated sediment will be removed when it reaches 6 inches in depth.
- Temporary and permanent seeding will be inspected for bare spots, washouts, and healthy growth.
- The Contractor CESCL (BMP C160) will provide erosion control inspection services and stormwater disposal monitoring through construction. The City Inspector will be notified of daily construction activities and scheduled meetings between the CESCL and the Contractor.

The maintenance inspection report will be made after each inspection. Copies of the report forms to be completed by the CESCL are attached as Exhibit 1 of this CSWPPP. Completed forms will be provided to the City Inspector and will also be maintained onsite during the entire construction project. If construction activities or design modifications are made to the site plan that could impact stormwater, or if AHBL determines that the measures are not adequate to prevent erosion and the discharge of sediment from the site (based on turbidity measurements), this CSWPPP will be amended appropriately. The amended CSWPPP will have a description of the new activities that contribute to the increased pollutant loading and the planned source control activities.

8.12 Manage the Project

The following practices will be required during construction to properly manage activities:

- Comply with seasonal work limitations.
- Inspect, maintain, and repair BMPs.
- Identify a CESCL (BMP C160).
- Maintain the CSWPPP onsite at all times, including narrative and plans.

8.13 Protect Low Impact Development BMPs

- Proposed infiltration location will be protected from construction vehicles and equipment to the maximum extent practical.
- Proposed sediment ponds will be designed to not impact infiltration interface of future infiltration facility.
- All Low Impact Development (LID) BMPs should be kept clean of sediment and equipment to the maximum extent practical.

9.0 Construction Sequence and Phasing

9.1 Construction Sequence

The construction sequence is described below:

1. Flag clearing limits.

2. Schedule and attend preconstruction meeting with the City of Kittitas and Park Project Manager.

3. Provide miscellaneous demolition and clear and grub area within clearing limits required for installation of temporary erosion control facilities. All erosion and sediment control facilities shown on the erosion control plan shall be installed prior to, or as a first stage of site preparation.

4. Provide perimeter filter fabric fence, as shown.

5. The contractor shall inspect erosion control measures and provide repairs, as needed, per the project CSWPPP.

6. Rough grade to establish subgrade for parking area and swales.

7. Provide cover measures, to include armoring, mulching, and hydroseeding to stabilize denuded areas and prevent the transport of sediment-laden stormwater offsite.

8. Fine grade site and pave. Coordinate with City of Kittitas for required inspections.

9. Provide bio-infiltration swales, as shown on the plans. Coordinate with City of Kittitas for required inspections.

10. Stabilize all remaining disturbed areas. Do not remove perimeter controls until final inspections are completed.

9.2 Construction Phasing

No phasing is proposed. The proposed construction will be done as one project.

10.0 Construction Schedule

Construction is anticipated to begin in fall 2024 and be completed in early 2025. Based on the construction schedule, construction may be ongoing during the wet season. During construction, measures will be taken to prevent the transportation of sediment from the site to receiving waters. These measures include the use of, but are not limited to, the BMPs listed in Exhibit 2.

11.0 Financial/Ownership Responsibilities

The developer is the party responsible for initiation of bonds and other financial securities. The project must comply with City of Kittitas financial liability requirements.

12.0 Certified Erosion and Sediment Control Lead (CESCL)

The General Contractor shall be required to provide a CESCL prior to permit issuance. The CESCL can be identified at the preconstruction meeting. Once this individual is identified, the City Inspector will be notified.

The contractor will designate their CESCL here:

Name: _____

Address: _____

Phone: _____

Email: _____

The CESCL is required to meet Washington State Department of Ecology certification requirements. The City Inspector will be provided with CESCL information.

The duties of the CESCL include:

- Implementing the CSWPPP/TESC plan with the aid of the SWPP Team.
- Maintaining permit file on site at all times, which includes the Construction SWPPP and any associated permits and plans.
- Overseeing installation, inspection, maintenance, modification, and removal practices identified as BMPs in the CSWPPP.
- Conducting or providing for inspection and monitoring activities every seven days and within 24 hours of a rainfall event of 0.5 inch or more.
- Keeping daily logs, and inspection reports.
    - Inspection date/time.
    - Weather information; general conditions during inspection and approximate amount of precipitation since the last inspection.
    - A summary or list of all BMPs implemented, including observations of all erosion/ sediment control structures or practices. The following shall be noted:
        - Locations of BMPs inspected.
        - Locations of BMPs that need maintenance.
        - Locations of BMPs that failed to operate as designed or intended.
        - Locations of where additional or different BMPs are required.
    - Visual monitoring results, including a description of discharged stormwater. The presence of suspended sediment, turbid water, discoloration, and oil sheen shall be noted, as applicable.
    - Any water quality monitoring performed during inspection.
    - General comments and notes, including a brief description of any BMP repairs, maintenance, or installations made as a result of the inspection.

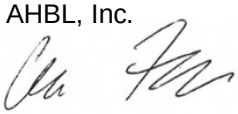
- Facilitating, participating in, and taking corrective actions resulting from inspections performed by outside agencies or the owner.
- Identifying other potential pollutant sources and ensuring they are added to the plan.
- Identifying any deficiencies in the CSWPPP and ensuring they are corrected.
- Ensuring that any changes in construction plans are addressed in the CSWPPP.

To aid in the implementation of the CSWPPP, the members of the SWPP Team include the following: General Contractor, CESCL, City of Kittitas Inspector, the geotechnical engineering consultant, and AHBL.

The General Contractor will ensure that all housekeeping and monitoring procedures are implemented, while the CESCL will ensure the integrity of the structural BMPs. The SWPP Team will observe construction and erosion control practices and recommend revisions or additions to the CSWPPP and drawings.

This analysis is based on data and records either supplied to or obtained by AHBL, Inc. These documents are referenced within the text of the analysis. The analysis has been prepared using procedures and practices within the standard accepted practices of the industry. We conclude that this project, as proposed, will not create any new problems within the existing downstream drainage system. This project will not noticeably aggravate any existing downstream problems due to either water quality or quantity.

AHBL, Inc.



Chris Flyckt, PE
Project Engineer

CF/lsk

August 2024

Q:\2023\2230784\WORDPROC\Reports\20240808 Rpt (SWPPP) 2230784.10.docx

Exhibit 1

Inspection Logs

Kittitas Depot Historic Preservation
Construction Stormwater Pollution Prevention Plan
Inspection and Maintenance Report Form

To be completed every 7 days and within 24 hours of a rainfall event of 0.5 inches or more

Inspector: Date:

Inspector's Qualifications:

Days since last rainfall: Amount of last rainfall: inches

Stabilization Measures

Drainage Area	Date Since Last Disturbance	Date of Disturbance	Stabilized (yes/No)	Stabilized With	Condition

Stabilization required:

To be performed by: _____ On or before: _____

Kittitas Depot Historic Preservation
Construction Stormwater Pollution Prevention Plan
Inspection and Maintenance Report Form

Perimeter Structural Controls:

Date:

Silt Fence

Drainage Area Perimeter	Has Silt Reached 1/3 of Fence Height?	Is Fence Properly Secured?	Is There Evidence of Washout or Overtopping?

Maintenance required for silt fence and straw bales:

To be performed by: _____ On or before: _____

Kittitas Depot Historic Preservation

Construction Stormwater Pollution Prevention Plan

Inspection and Maintenance Report Form

Changes required to the pollution prevention plan:

Reasons for changes:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signature: _____ Date: _____

Construction Stormwater Site Inspection Form

Project Name Kittitas Historic Depot Permit # _____ Inspection Date _____ Time _____

Name of Certified Erosion Sediment Control Lead (CESCL) or qualified inspector if *less than one acre*
Print Name: _____

Approximate rainfall amount since the last inspection (in inches): _____

Approximate rainfall amount in the last 24 hours (in inches): _____

Current Weather Clear ☐ Cloudy ☐ Mist ☐ Rain ☐ Wind ☐ Fog ☐

A. Type of inspection: Weekly ☐ Post Storm Event ☐ Other ☐

B. Phase of Active Construction (*check all that apply*):

Pre Construction/installation of erosion/sediment controls	☐	Clearing/Demo/Grading	☐	Infrastructure/storm/roads	☐
Concrete pours	☐	Vertical Construction/buildings	☐	Utilities	☐
Offsite improvements	☐	Site temporary stabilized	☐	Final stabilization	☐

C. Questions:

1. Were all areas of construction and discharge points inspected? Yes ___ No ___
2. Did you observe the presence of suspended sediment, turbidity, discoloration, or oil sheen Yes ___ No ___
3. Was a water quality sample taken during inspection? (*refer to permit conditions S4 & S5*) Yes ___ No ___
4. Was there a turbid discharge 250 NTU or greater, or Transparency 6 cm or less?* Yes ___ No ___
5. If yes to #4 was it reported to Ecology? Yes ___ No ___
6. Is pH sampling required? pH range required is 6.5 to 8.5. Yes ___ No ___

If answering yes to a discharge, describe the event. Include when, where, and why it happened; what action was taken, and when.

_____

_____

_____

_____

*If answering yes to # 4 record NTU/Transparency with continual sampling daily until turbidity is 25 NTU or less/ transparency is 33 cm or greater.

Sampling Results: Date: _____

Parameter	Method (circle one)	Result			Other/Note
		NTU	cm	pH	
Turbidity	tube, meter, laboratory				
pH	Paper, kit, meter				

Construction Stormwater Site Inspection Form

D. Check the observed status of all items. Provide "Action Required "details and dates.

Element #	Inspection	BMPs Inspected			BMP needs maintenance	BMP failed	Action required (describe in section F)
		yes	no	n/a			
1 Clearing Limits	Before beginning land disturbing activities are all clearing limits, natural resource areas (streams, wetlands, buffers, trees) protected with barriers or similar BMPs? (high visibility recommended)						
2 Construction Access	Construction access is stabilized with quarry spalls or equivalent BMP to prevent sediment from being tracked onto roads?						
	Sediment tracked onto the road way was cleaned thoroughly at the end of the day or more frequent as necessary.						
3 Control Flow Rates	Are flow control measures installed to control stormwater volumes and velocity during construction and do they protect downstream properties and waterways from erosion?						
	If permanent infiltration ponds are used for flow control during construction, are they protected from siltation?						
4 Sediment Controls	All perimeter sediment controls (e.g. silt fence, wattles, compost socks, berms, etc.) installed, and maintained in accordance with the Stormwater Pollution Prevention Plan (SWPPP).						
	Sediment control BMPs (sediment ponds, traps, filters etc.) have been constructed and functional as the first step of grading.						
	Stormwater runoff from disturbed areas is directed to sediment removal BMP.						
5 Stabilize Soils	Have exposed un-worked soils been stabilized with effective BMP to prevent erosion and sediment deposition?						

Construction Stormwater Site Inspection Form

Element #	Inspection	BMPs Inspected			BMP needs maintenance	BMP failed	Action required (describe in section F)
		yes	no	n/a			
5 Stabilize Soils Cont.	Are stockpiles stabilized from erosion, protected with sediment trapping measures and located away from drain inlet, waterways, and drainage channels?						
	Have soils been stabilized at the end of the shift, before a holiday or weekend if needed based on the weather forecast?						
6 Protect Slopes	Has stormwater and ground water been diverted away from slopes and disturbed areas with interceptor dikes, pipes and or swales?						
	Is off-site storm water managed separately from stormwater generated on the site?						
	Is excavated material placed on uphill side of trenches consistent with safety and space considerations?						
	Have check dams been placed at regular intervals within constructed channels that are cut down a slope?						
7 Drain Inlets	Storm drain inlets made operable during construction are protected.						
	Are existing storm drains within the influence of the project protected?						
8 Stabilize Channel and Outlets	Have all on-site conveyance channels been designed, constructed and stabilized to prevent erosion from expected peak flows?						
	Is stabilization, including armoring material, adequate to prevent erosion of outlets, adjacent stream banks, slopes and downstream conveyance systems?						
9 Control Pollutants	Are waste materials and demolition debris handled and disposed of to prevent contamination of stormwater?						
	Has cover been provided for all chemicals, liquid products, petroleum products, and other material?						
	Has secondary containment been provided capable of containing 110% of the volume?						
	Were contaminated surfaces cleaned immediately after a spill incident?						
	Were BMPs used to prevent contamination of stormwater by a pH modifying sources?						

Construction Stormwater Site Inspection Form

Element #	Inspection	BMPs Inspected			BMP needs maintenance	BMP failed	Action required (describe in section F)
		yes	no	n/a			
9 Cont.	Wheel wash wastewater is handled and disposed of properly.						
10 Control Dewatering	Concrete washout in designated areas. No washout or excess concrete on the ground.						
	Dewatering has been done to an approved source and in compliance with the SWPPP.						
	Were there any clean non turbid dewatering discharges?						
11 Maintain BMP	Are all temporary and permanent erosion and sediment control BMPs maintained to perform as intended?						
12 Manage the Project	Has the project been phased to the maximum degree practicable?						
	Has regular inspection, monitoring and maintenance been performed as required by the permit?						
	Has the SWPPP been updated, implemented and records maintained?						
13 Protect LID	Is all Bioretention and Rain Garden Facilities protected from sedimentation with appropriate BMPs?						
	Is the Bioretention and Rain Garden protected against over compaction of construction equipment and foot traffic to retain its infiltration capabilities?						
	Permeable pavements are clean and free of sediment and sediment laden-water runoff. Muddy construction equipment has not been on the base material or pavement.						
	Have soiled permeable pavements been cleaned of sediments and pass infiltration test as required by stormwater manual methodology?						
	Heavy equipment has been kept off existing soils under LID facilities to retain infiltration rate.						

E. Check all areas that have been inspected. ✔

All in place BMPs ☐ All disturbed soils ☐ All concrete wash out area ☐ All material storage areas ☐
All discharge locations ☐ All equipment storage areas ☐ All construction entrances/exits ☐

F. Elements checked "Action Required" (section D) describe corrective action to be taken. List the element number; be specific on location and work needed. Document, initial, and date when the corrective action has been completed and inspected.

Element #	Description and Location	Action Required	Completion Date	Initials

Attach additional page if needed

Sign the following certification:

"I certify that this report is true, accurate, and complete, to the best of my knowledge and belief"

Inspected by: (print) _____ (Signature) _____ Date: _____

Title/Qualification of Inspector: CESCL

Exhibit 2

Selected Best Management Practices (BMPs)

- High Visibility Fence (BMP C103)
- Stabilized Construction Access (BMP C105)
- Temporary and Permanent Seeding (BMP C120)
- Mulching (BMP C121)
- Plastic Covering (BMP C123)
- Dust Control (BMP C140)
- Materials on Hand (BMP C150)
- Concrete Handling (BMP C151)
- Sawcutting and Surfacing Pollution Prevention (BMP C152)
- Material Delivery, Storage, and Containment (BMP C153)
- Certified Erosion and Sediment Control Lead (BMP C160)
- Scheduling (BMP C162)
- Silt Fence (BMP C233)

7.3 Standards and Specifications for Best Management Practices

7.3.1 Introduction

Best Management Practices (BMPs) are defined as schedules of activities, prohibitions of practices, maintenance procedures, and structural and/or managerial practices, that when used singly or in combination, prevent or reduce the release of pollutants to waters of Washington State. This section contains standards and specifications for temporary BMPs to be used as applicable during the construction phase of a project. Often using BMPs in combination is the best method to meet Construction Stormwater Pollution Prevention Plan (SWPPP) requirements.

None of the BMPs will work successfully during the construction project without inspection and maintenance. Regular inspections to identify problems with the operation of each BMP, and the timely repair of any problems, are essential to the continued operation of the BMPs.

- 7.3.2 Source Control BMPs contains the standards and specifications for source control BMPs.
- 7.3.3 Runoff Conveyance and Treatment BMPs contains the standards and specifications for runoff conveyance and treatment BMPs.

The standards for each individual BMP are divided into four sections:

- Purpose
- Conditions of Use
- Design and Installation Specifications
- Maintenance Standards

Note: "Conditions of Use" always refers to site conditions. As site conditions change, BMPs must be changed to remain in compliance.

For more information: Information on streambank stabilization is available in the *Integrated Streambank Protection Guidelines* (WDFW, 2002).

7.3.2 Source Control BMPs

BMP C101E: Preserving Natural Vegetation

Purpose

The purpose of preserving natural vegetation is to reduce erosion wherever practicable. Limiting site disturbance is the single most effective method for reducing erosion. For example, conifers can hold up to about 50% of all rain that falls during a storm. Up to 20% to 30% of this rain may never reach the ground but is taken up by the tree or evaporates. Another benefit is that the rain held in the tree can be released slowly to the ground after the storm.

Conditions of Use

Natural vegetation should be preserved on steep slopes, near perennial and intermittent receiving waters or swales, and on building sites in wooded areas.

- As required by the local jurisdiction.
- Phase construction to preserve natural vegetation on the project site for as long as possible during the construction period.

Design and Installation Specifications

Natural vegetation can be preserved in natural clumps or as individual trees, shrubs and vines.

The preservation of individual plants is more difficult because heavy equipment is generally used to remove unwanted vegetation. The points to remember when attempting to save individual plants are the following:

- Whether the plant is worth saving. Consider the location, species, size, age, vigor, and the work involved. Local jurisdictions may also have ordinances to save natural vegetation and trees.
- Fence or clearly mark areas around trees that are to be saved. It is preferable to keep ground disturbance away from the trees at least as far out as the dripline.

Plants need protection from three kinds of injuries:

- Construction equipment: This injury can be above or below the ground level. Damage results from scarring, cutting of roots, and compaction of the soil. Placing a fenced buffer zone around plants to be saved prior to construction can prevent construction equipment injuries.
- Grade changes: Changing the natural ground level will alter grades, which affects the plant's ability to obtain the necessary air, water, and minerals. Minor fills usually do not cause problems although sensitivity between species does vary and should be checked. Trees can tolerate fill of 6 inches or less. For shrubs and other plants, the fill should be less.

  When there are major changes in grade, it may become necessary to supply air to the roots of plants. This can be done by placing a layer of gravel and a tile system over the roots before the fill is made. The tile system should be laid out on the original grade leading from a drywell around the tree trunk. The system should then be covered with small rocks to allow air to circulate over the root area.
- Lowering the natural ground level can seriously damage trees and shrubs. The highest percentage of the plant roots are in the upper 12 inches of the soil and cuts of only 2 to 3 inches can cause serious injury. To protect the roots, it may be necessary to terrace the immediate area around the plants to be saved. If roots are exposed, construction of retaining walls may be needed to keep the soil in place. Plants can also be preserved by leaving them on an undisturbed, gently sloping mound. To increase the chances for survival, it is best to limit grade changes and other soil disturbances to areas outside the dripline of the plant.
- Excavations: Protect trees and other plants when excavating for drain fields and power, water, and sewer lines. Where possible, the trenches should be routed around trees and large

shrubs. When this is not possible, it is best to tunnel under them. This can be done with hand tools or with power augers. If it is not possible to route the trench around plants to be saved, the following guidelines should be followed:

  - Cut as few roots as possible. When you have to cut, cut clean. Paint cut root ends with a wood dressing like asphalt base paint if roots will be exposed for more than 24 hours.
  - Backfill the trench as soon as possible.
  - Tunnel beneath root systems as close to the center of the main trunk to preserve most of the important feeder roots.

Some problems that can be encountered are the following:

- In general, most trees native to eastern Washington do not readily adjust to major changes in environment and special care should be taken to protect these trees.
- The danger of windthrow increases where dense stands of coniferous trees have been thinned. Other species (unless they are on shallow, wet soils less than 20 inches deep) have a low windthrow hazard.
- Cottonwoods, maples, and willows have water-seeking roots. These can cause trouble in sewer lines and infiltration fields. On the other hand, they thrive in high moisture conditions that other trees would not.
- Thinning operations in pure or mixed stands of grand fir, Pacific silver fir, noble fir, Sitka spruce, western redcedar, western hemlock, Pacific dogwood, and red alder can cause serious disease problems. Disease can become established through damaged limbs, trunks, roots, and freshly cut stumps. Diseased and weakened trees are also susceptible to insect attack.

Maintenance Standards

- Inspect flagged and/or fenced areas regularly to make sure flagging or fencing has not been removed or damaged. If the flagging or fencing has been damaged or visibility reduced, it shall be repaired or replaced immediately and visibility restored.
- If tree roots have been exposed or injured, “prune” cleanly with an appropriate pruning saw or loppers directly above the damaged roots and recover with native soils. Treatment of sap flowing trees (e.g., fir, hemlock, pine, soft maples) is not advised as sap forms a natural healing barrier.

BMP C102E: Buffer Zones

Purpose

Creation of an undisturbed area or strip of natural vegetation or an established suitable planting that will provide a living filter to reduce soil erosion and stormwater runoff velocities.

Conditions of Use

- Natural buffer zones are used along streams, wetlands and other bodies of water that need protection from erosion and sedimentation. Contractors can use vegetative buffer zones to protect natural swales, and they can incorporate them into the natural landscaping of an area.
- Do not use critical-areas buffer zones as sediment treatment areas. These areas shall remain completely undisturbed. The jurisdiction may expand the buffer widths temporarily to allow the use of the expanded area for removal of sediment.

Design and Installation Specifications

- Preserving natural vegetation or plantings in clumps, blocks, or strips is generally the easiest and most successful method.
- Leave all unstable steep slopes in natural vegetation.
- Mark clearing limits and keep all equipment and construction debris out of the natural areas and buffer zones. Steel construction fencing is the most effective method to protect sensitive areas and buffers. Alternatively, wire-backed silt fence on steel posts is marginally effective. Flagging alone is typically not effective.
- Keep all excavations outside the dripline of trees and shrubs.
- Do not push debris or extra soil into the buffer zone area because it will cause damage by burying and smothering vegetation.
- Vegetative buffer zones for streams, lakes or other receiving waters shall be established by the jurisdiction or other state or federal permits or approvals.

Maintenance Standards

Inspect the area frequently to make sure flagging remains in place and the area remains undisturbed. Replace all damaged flagging immediately.

BMP C103E: High-Visibility Fence

Purpose

High-visibility fencing is intended to:

- Restrict clearing to approved limits;
- Prevent disturbance of sensitive areas, their buffers, and other areas required to be left undisturbed;
- Limit construction traffic to designated construction entrances, exits, or internal roads; and
- Protect areas where marking with survey tape may not provide adequate protection.

Conditions of Use

To establish clearing limits, plastic, fabric, or metal fence may be used under certain conditions:

- At the boundary of sensitive areas, their buffers, and other areas required to be left uncleared
- As necessary to control vehicle access to and on the site

Design and Installation Specifications

- High-visibility plastic fence shall be composed of a high-density polyethylene (HDPE) material and shall be ≥ 4 feet in height. Posts for the fencing shall be steel or wood and placed every 6 feet on center (maximum) or as needed to ensure rigidity. The fencing shall be fastened to the post every 6 inches with a polyethylene tie. On long continuous lengths of fencing, a tension wire or rope shall be used as a top stringer to prevent sagging between posts. The fence color shall be high-visibility orange. The fence tensile strength shall be 360 pounds per foot (lb/ft) using the ASTM D4595 testing method.
- If appropriate, install fabric silt fence in accordance with BMP C233E (Silt Fence) to act as high-visibility fence. Silt fence shall be ≥ 3 feet high and must be highly visible to meet the requirements of this BMP.
- Metal fences shall be designed and installed according to the manufacturer's specifications.
- Metal fences shall be ≥ 3 feet high and must be highly visible.
- Fences shall not be wired or stapled to trees.

Maintenance Standards

If the fence has been damaged or visibility reduced, it shall be repaired or replaced immediately and visibility restored.

BMP C105E: Stabilized Construction Access

Stabilized construction entrances are established to reduce the amount of sediment transported onto paved roads by vehicles or equipment. This is done by constructing a stabilized pad of quarry spalls at entrances and exits for construction sites.

- Construction entrances shall be stabilized wherever traffic will be entering or leaving a construction site if paved roads or other paved areas are within 1,000 feet of the site.
- For residential subdivision construction sites, provide stabilized construction entrances for each residence, rather than only at the main subdivision entrance. Stabilized surfaces shall be of sufficient length/width to provide vehicle access/parking, based on lot size and configuration.
- On large commercial, highway, and road projects, the designer should include enough extra materials in the contract to allow for additional stabilized entrances not shown in the initial Construction Stormwater Pollution Prevention Plan (SWPPP). It is difficult to determine exactly where access to these projects will take place; additional materials will enable the contractor to install them where needed.

Design and Installation

- See Figure 7.3: Stabilized Construction Entrance for details.

  Note: The 100-foot minimum length of the entrance shall be reduced to the maximum practicable size when the size or configuration of the site does not allow the full length (100 feet).

- Construct stabilized construction entrances with a 12-inch thick pad of 4- to 8-inch quarry spalls, a 4-inch course of asphalt treated base (ATB), or use existing pavement. Do not use crushed concrete, cement, or calcium chloride for construction entrance stabilization because these products increase pH levels in stormwater, and concrete discharge to surface waters of the state is prohibited.

- A separation geotextile shall be placed under the spalls to prevent fine sediment from pumping up into the rock pad. The geotextile shall meet the following standards listed in Table 7.1: Stabilized Construction Entrance Geotextile Standards.

Figure 7.3: Stabilized Construction Entrance

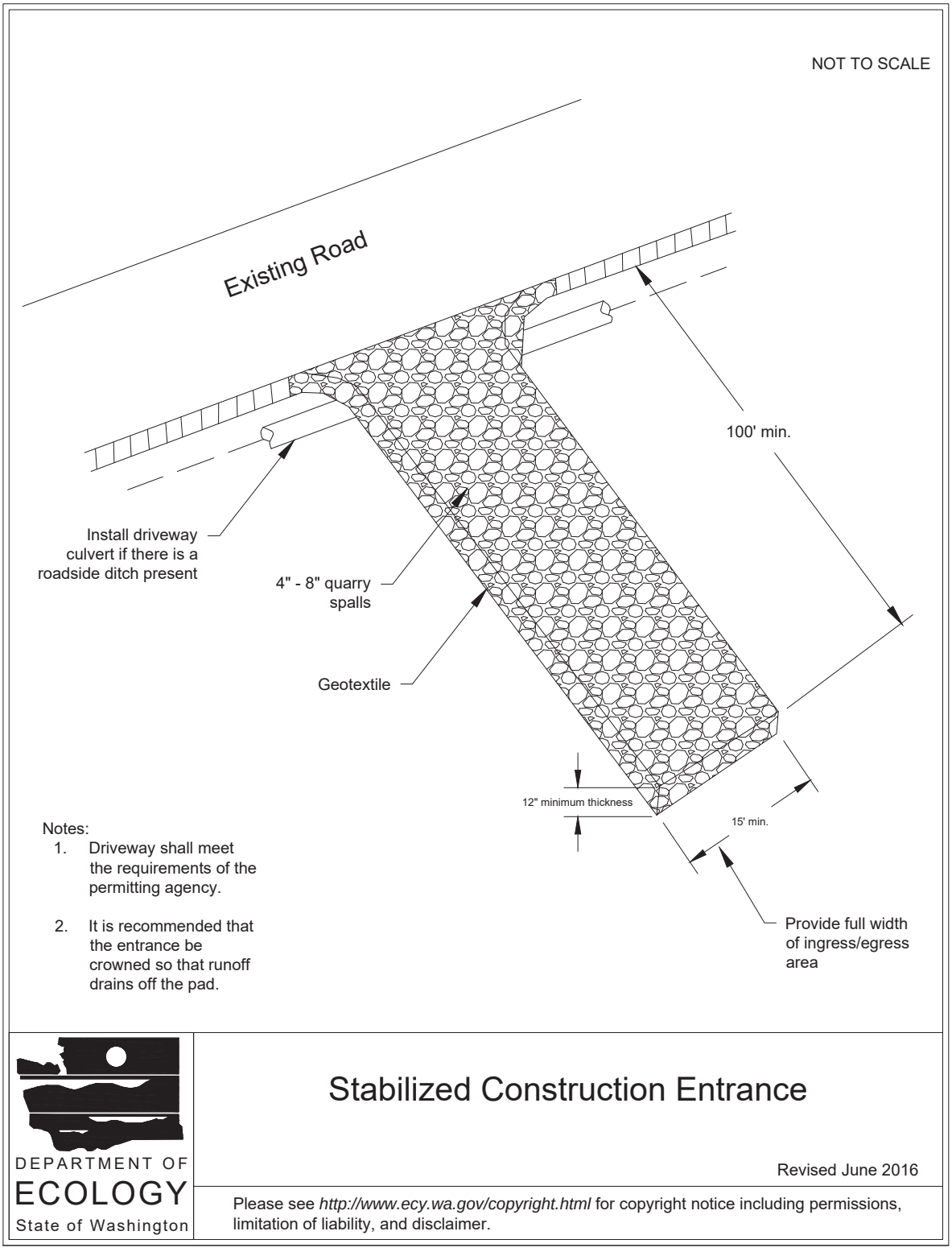


Table 7.1: Stabilized Construction Entrance Geotextile Standards

Geotextile Property	Required Value
Grab Tensile Strength (ASTM D4751)	200 pounds per square inch (psi) minimum
Grab Tensile Elongation (ASTM D4632)	30% maximum
Mullen Burst Strength (ASTM D3786-80a)	400 psi minimum
Apparent Opening Size (ASTM D4751)	No. 20 to No. 45 (U.S. standard sieve size)

- Consider early installation of the first lift of asphalt in areas that will be paved; this can be used as a stabilized entrance. Also consider the installation of excess concrete as a stabilized entrance. During large concrete pours, excess concrete is often available for this purpose.
- Fencing (see BMP C103E: High-Visibility Fence) shall be installed as necessary to restrict traffic to the construction entrance.
- Whenever possible, the entrance shall be constructed on a firm, compacted subgrade. This can substantially increase the effectiveness of the pad and reduce the need for maintenance.
- Construction entrances should avoid crossing existing sidewalks and back of walk drains if at all possible. If a construction entrance must cross a sidewalk or back of walk drain, the full length of the sidewalk and back of walk drain must be covered and protected from sediment leaving the site.
- Alternative material specification:
    - The Washington State Department of Transportation (WSDOT) has raised safety concerns about the quarry spall rock specified in the second bullet in the Design and Installation subsection. WSDOT has noticed that rocks measuring 4 to 8 inches can become trapped between dually truck tires and subsequently released off-site at highway speeds. WSDOT has chosen to use a modified specification for the rock while continuously verifying that the stabilized construction entrance remains effective. To remain effective, the BMP must prevent sediment from migrating off-site. To date, there has been no performance testing to verify operation of this new specification. Local jurisdictions may use the alternative specification, but must perform increased off-site inspections
    - Stabilized construction entrances may use material that meets the requirements of the latest version of WSDOT's *Standard Specifications for Road, Bridge, and Municipal Construction* for ballast unless the alternative grading and quality requirements listed in Table 7.2: Stabilized Construction Entrance Alternative Material Requirements are used.

Table 7.2: Stabilized Construction Entrance Alternative Material Requirements

Sieve Size	Percentage Passing
2.5 inches	99 to 100
2 inch	65 to 100
3/4 inch	40 to 80
No. 4	5 maximum
No. 100	0 to 2
% Fracture	75 minimum
Notes: All percentages are by weight. The sand equivalent value and dust ratio requirements do not apply. The fracture requirement shall be at least one fractured face and will apply the combined aggregate retained on the No. 4 sieve in accordance with FOP for AASHTO T 335.	

Maintenance Standards

Quarry spalls shall be added if the pad is no longer in accordance with the specifications.

- If the entrance is not preventing sediment from being tracked onto pavement, then alternative measures to keep the streets free of sediment shall be used. This may include replacement/cleaning of the existing quarry spalls, street sweeping, an increase in the dimensions of the entrance, or the installation of BMP C106E: Wheel Wash.
- Any sediment that is tracked onto pavement shall be removed by shoveling or street sweeping. The sediment collected by sweeping shall be removed or stabilized on-site. The pavement shall not be cleaned by washing down the street, except when sweeping is ineffective and there is a threat to public safety. If it is necessary to wash the streets, the construction of a small sump to contain the washwater shall be considered. The sediment would then be washed into the sump where it can be controlled.
- Perform street sweeping by hand or with a high-efficiency sweeper. Do not use a non-high-efficiency mechanical sweeper because this creates dust and throws soils into storm systems or conveyance ditches.
- Any quarry spalls that are loosened from the pad, which end up on the roadway shall be removed immediately.
- If vehicles are entering or exiting the site at points other than the construction entrance(s) BMP C103E: High-Visibility Fence shall be installed to control traffic.
- Upon project completion and site stabilization, all construction accesses intended as permanent access for maintenance shall be permanently stabilized.

Approved as Functionally Equivalent

The Washington State Department of Ecology (Ecology) has approved products as able to meet the requirements of this BMP. The products did not pass through the Technology Assessment Protocol–Ecology (TAPE) process. Local jurisdictions may choose not to accept these products or may require additional testing prior to consideration for local use. Products that Ecology has approved as functionally equivalent are available for review on Ecology's Emerging Stormwater Treatment Technologies (TAPE) web page at the following address:

https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Stormwater-permittee-guidance-resources/Emerging-stormwater-treatment-technologies

BMP C106E: Wheel Wash

Purpose

Wheel washes reduce the amount of sediment transported onto paved roads by washing dirt from the wheels of motor vehicles prior to the motor vehicles leaving the construction site.

Conditions of Use

- Use a wheel wash when BMP C105E: Stabilized Construction Access is not preventing sediment from being tracked off-site.
- Wheel washing is generally an effective BMP when installed with careful attention to topography. For example, a wheel wash can be detrimental if installed at the top of a slope abutting a right-of-way where the water from the dripping truck can run unimpeded into the street.
- Pressure washing combined with an adequately sized and surfaced pad with direct drainage to a large 10- by 10-foot sump can be very effective.
- Wheel wash wastewater is process water and must be discharged to a separate on-site treatment system that prevents discharge to a receiving water or to the sanitary sewer with local sewer district approval.
- Wheel washes may use closed-loop recirculation systems to conserve water use.
- Wheel wash wastewater shall not include wastewater from concrete washout areas.
- When practical, the wheel wash should be placed in sequence with BMP C105E: Stabilized Construction Access. Locate the wheel wash such that vehicles exiting the wheel wash will enter directly onto the stabilized construction entrance/exit. To achieve this, the entrance/exit may need to be extended beyond the standard installation to meet the exit of the wheel wash.

Design and Installation Specifications

- Suggested details are shown in Figure 7.4: Wheel Wash. The local permitting authority may allow other designs. A minimum of 6 inches of asphalt treated base (ATB) over crushed base material or 8 inches over a good subgrade is recommended to pave the wheel wash.
- Use a low-clearance truck to test the wheel wash before paving. Either a belly dump or

lowboy will work well to test clearance.

- Keep the water level from 12 to 14 inches deep to avoid damage to truck hubs and filling the truck tongues with water.
- Midpoint spray nozzles are needed only in extremely muddy conditions.
- Wheel wash systems should be designed with a small grade change, 6 to 12 inches for a 10-foot-wide pond, to allow sediment to flow to the low side of the pond to help prevent resuspension of sediment. A drainpipe with a 2- to 3-foot riser should be installed on the low side of the pond to allow easy cleaning and refilling. Polymers may be used to promote coagulation and flocculation in a closed-loop system. Polyacrylamide (PAM) added to the wheel washwater at a rate of 0.25 to 0.5 pounds per 1,000 gallons of water increases effectiveness and reduces cleanup time. If PAM is already being used for dust or erosion control and is being applied by a water truck, the same truck can be used to change the washwater.

Maintenance Standards

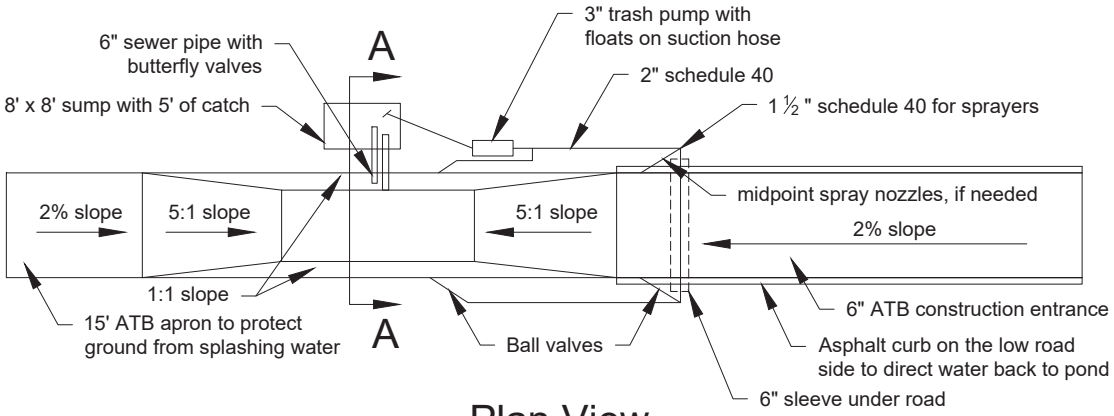
- The wheel wash should start out each day with fresh water.
- The washwater for the wheel wash should be changed a minimum of once per day. On large earthwork jobs where more than 10 to 20 trucks per hour are expected, the wheel washwater will need to be changed more often.

Approved as Functionally Equivalent

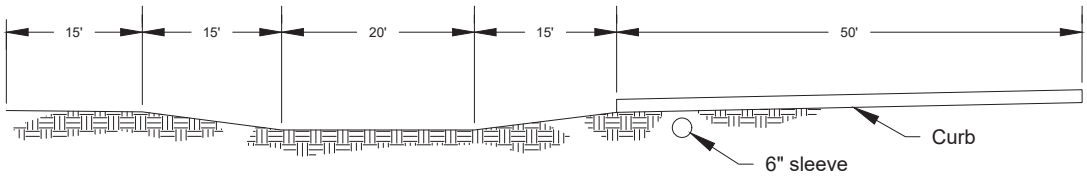
The Washington State Department of Ecology (Ecology) has approved products as able to meet the requirements of this BMP. The products did not pass through the Technology Assessment Protocol–Ecology (TAPE) process. Local jurisdictions may choose not to accept these products or may require additional testing prior to consideration for local use. Products that Ecology has approved as functionally equivalent are available for review on Ecology's Emerging Stormwater Treatment Technologies (TAPE) web page at the following address:

https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Stormwater-permittee-guidance-resources/Emerging-stormwater-treatment-technologies

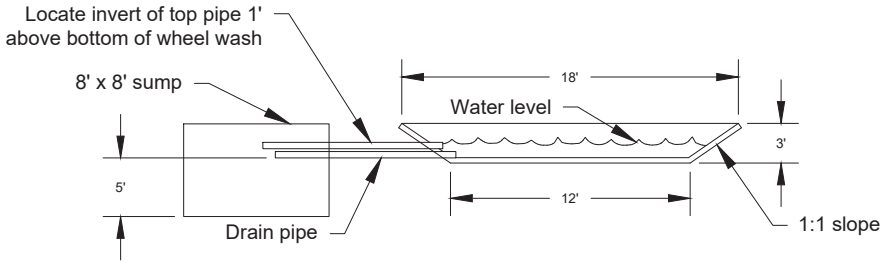
Figure 7.4: Wheel Wash



Plan View



Elevation View



Section A-A

Notes:
1. Build 8' x 8' sump to accomodate cleaning by trackhoe.

NOT TO SCALE

DEPARTMENT OF ECOLOGY
State of Washington

Wheel Wash

Revised June 2016

BMP C107E: Construction Road/Parking Area Stabilization

Purpose

Stabilizing roads, parking areas, and other on-site vehicle transportation routes immediately after grading reduces erosion caused by construction traffic or stormwater runoff.

Conditions of Use

- Roads and parking areas shall be stabilized wherever they are constructed, whether permanent or temporary, for use by construction traffic.
- BMP C103E: High-Visibility Fence shall be installed, if necessary, to limit the access of vehicles to only those roads and parking areas that are stabilized.

Design and Installation Specifications

- On areas that will receive asphalt as part of the project, install the first lift as soon as possible.
- A 6-inch depth of 2- to 4-inch crushed rock, gravel base, or crushed surfacing base course shall be applied immediately after grading or utility installation. A 4-inch course of asphalt treated base (ATB) may also be used, or the road/parking area may be paved. It may also be possible to use cement or calcium chloride for soil stabilization. If cement or cement kiln dust is used for road base stabilization, pH monitoring and implementation of BMP C252E: Treating and Disposing of High pH Water is necessary to evaluate and minimize the effects on stormwater. If the area will not be used for permanent roads, parking areas, or structures, a 6-inch depth of hog fuel may also be used, but this is likely to require more maintenance. Whenever possible, construction roads and parking areas shall be placed on a firm, compacted subgrade.
- Temporary road gradients shall be < 15%. Roadways shall be carefully graded to drain. Drainage ditches shall be provided on each side of the roadway in the case of a crowned section, or on one side in the case of a superelevated section. Drainage ditches shall be directed to a sediment control BMP.
- Rather than relying on ditches, it may also be possible to grade the road so that runoff sheet-flows into a heavily vegetated area with a well-developed topsoil. Landscaped areas are not adequate. If this area has ≥ 50 feet of vegetation, then it is generally preferable to use the vegetation to treat runoff, rather than a sediment pond or trap. The 50 feet shall not include wetlands. If runoff is allowed to sheet flow through adjacent vegetated areas, it is vital to design the roadways and parking areas so that no concentrated runoff is created.
- Storm drain inlets shall be protected to prevent sediment-laden water from entering the drainage system (see BMP C220E: Inlet Protection).

Maintenance Standards

- Inspect stabilized areas regularly, especially after large storm events.
- Crushed rock, gravel base, etc., shall be added as required to maintain a stable driving surface and to stabilize any areas that have eroded.

- Following construction, these areas shall be restored to preconstruction condition or better to prevent future erosion.
- Perform street cleaning at the end of each day or more often if necessary.

BMP C120E: Temporary and Permanent Seeding

Purpose

Seeding reduces erosion by stabilizing exposed soils. A well-established vegetative cover is one of the most effective methods of reducing erosion.

Conditions of Use

- Use seeding throughout the project on disturbed areas that have reached final grade or that will remain unworked for > 30 days. See Element #5: Stabilize Soils for specific timelines for stabilizing exposed soils.
- The optimum permanent seeding window for eastern Washington is October 1 through November 15.
- The acceptable permanent seeding window for eastern Washington is September 1 through April 30.
- Seeding permanent species is not recommended for eastern Washington from May 1 through August 31, unless irrigation is conducted.
- Review all disturbed areas in late August to early September and complete all seeing by the end of April. Otherwise, vegetation will not establish itself well enough to provide more than average protection.
- Mulch is required at all times for seeding because it protects seeds from heat, moisture loss, and transport due to runoff. Mulch can be applied on top of the seed or simultaneously by hydroseeding. See BMP C121E: Mulching for specifications.
- Seed and mulch all disturbed areas not otherwise vegetated at final site stabilization. Final stabilization means the completion of all soil disturbing activities at the site and the establishment of a permanent vegetative cover, or equivalent permanent stabilization measures (such as pavement, riprap, gabions or geotextiles) which will prevent erosion. See BMP F6.61: Amending Construction Site Soils.

Design and Installation Specifications

General

- Install channels intended for vegetation before starting major earthwork and hydroseed with a bonded fiber matrix (BFM). For vegetated channels that will have high flows, install erosion control blankets over hydroseed. Before allowing water to flow in vegetated channels, establish a 50% vegetation cover of all seeded areas after 3 months of active growth following germination during the growing season. If vegetated channels cannot be established by seed before water flow, install sod or prevegetated mats in the channel bottom over hydromulch

and blankets.

- Confirm the installation of all required stormwater control measures to prevent seed from washing away.
- Hydroseed applications shall include a minimum of 1,500 pounds per acre (lb/acre) of mulch with 3% tackifier.
- Mulch is always required for seeding. Apply mulch on top of the seed or simultaneously by hydroseeding. See BMP C121E: Mulching for specifications.
- Areas that will have seeding only and not landscaping may need compost or meal-based mulch included in the hydroseed in order to establish vegetation. Reinstall native topsoil on the disturbed soil surface before application. See BMP F6.61 (Amending Construction Site Soils) in Chapter 6 - Flow Control BMP Design.
- When installing seed via hydroseeding operations, only about one-third of the seed actually ends up in contact with the soil surface. This reduces the ability to establish a good stand of grass quickly. One way to overcome this is to increase seed quantities by up to 50%.
- Vegetation establishment can be enhanced by one of the following two approaches:
    - Approach 1: Enhance vegetation establishment by dividing the hydromulch operation into two phases:
        - Phase 1 – Install all seed and fertilizer with 25% to 30% mulch and tackifier onto the soil in the first lift.
        - Phase 2 – Install the remaining mulch and tackifier over the first lift.
    - Approach 2: Vegetation can also be enhanced by:
        - Installing the mulch, seed, fertilizer, and tackifier in one lift;
        - Spreading or blowing straw over the top of the hydromulch at a rate of about 800 to 1,000 lb/acre; or
        - Holding straw in place with a standard tackifier.
    - Both of these approaches (Approach 1 and Approach 2) will increase cost moderately but will greatly improve and enhance vegetative establishment. The increased cost may be offset by the reduced need for:
        - Irrigation,
        - Reapplication of mulch, and
        - Repair of failed slope surfaces.

      Either of these approaches can use standard hydromulch (1,500 lb/acre minimum) and BFM/mechanically bonded fiber matrix (MBFM) (3,000 lb/acre minimum).
- Seed may be installed by hand if it is:

- Temporary and covered by straw, mulch, or topsoil; or
- Permanent in small areas (usually < 1 acre) and covered with mulch, topsoil, or erosion blankets.

- The seed mixes listed in Tables 7.3.3 through 7.3.12 include recommended mixes for both temporary and permanent seeding. Alternative seed mixes approved by the local jurisdiction may be used.
- Because it is difficult to generalize soil and climate conditions in eastern Washington, the project proponent is directed to check with the local suppliers or the local conservation district for appropriate seed mixes and application rates for their site based on a variety of factors, including location, exposure, soil type, slope, and expected foot traffic.
- In addition to meeting erosion control functions and not hindering maintenance operations, selection of long-lived, successional growth native vegetation that can compete against or exclude weeds and grow with minimal maintenance after plant establishment is preferred. Provide diversity to the greatest extent possible and plan for a succession of flowering times to improve pollinator habitat.

Table 7.3: Temporary Seeding shows seeding rates for four different seed mixes (A, B, C, and D) for the temporary stabilization of disturbed areas until permanent vegetation or other long-term erosion control measures can be established. These annual plants will generally not survive more than one growing season.

Table 7.3: Temporary Seeding

Common Name	Seeding Rate for Four Seed Mixes (lb/acre)			
	A	B	C	D
Winter or spring wheat (I)	80			
Spring barley (I)		80		
Regreen (I)[a] or triticale (I)			50	
Annual ryegrass (I)				15

[a]Sterile wheat x wheatgrass hybrid

I = introduced, nonnative plant species

Table 7.4: Permanent Seed Mixes: Upland Areas with Less than 12 Inches Precipitation shows three different erosion control seed mixes (A, B, and C) for upland areas that receive less than 12 inches effective precipitation. For each, drilled seeding rates are given (in lb/acre); double seed rates if broadcast or hydroseeded. Consideration should be given to the traffic hazard for wildlife when selecting food species for roadside stabilization.

Table 7.4: Permanent Seed Mixes: Upland Areas with Less than 12 Inches Precipitation

Common Name	Seeding Rate for Three Seed Mixes (lb/acre)[a]		
	A	B	C
Crested or Siberian wheatgrass* (droughty, coarse soils) (I)	7		
Bluebunch wheatgrass (N)		7	
Indian ricegrass (sandy soil)(N)	2		
Thickspike wheatgrass (N)			8
Sheep fescue (I)		1	1
Big bluegrass (N) or needle and thread grass (N)	1	1	
TOTAL	10	9	9
Seeds/sq ft/mixture	63	56	64

[a]Expressed as pure live seed

I = introduced, nonnative plant species

N = native plant species

sf = square feet

Table 7.5: Permanent Seed Mixes: Upland Areas That Receive 12 to 15 Inches Precipitation shows three different erosion control seed mixes (A, B, and C) for upland areas that receive 12 to 15 inches effective precipitation. For each, drilled seeding rates are given (in lb/acre); double seed rates if broadcast or hydroseeded. Consideration should be given to the traffic hazard for wildlife when selecting food species for roadside stabilization.

Table 7.5: Permanent Seed Mixes: Upland Areas That Receive 12 to 15 Inches Precipitation

Common Name	Seeding Rate for Three Seed Mixes (lb/acre)[a]		
	A	B	C
Bluebunch or beardless wheatgrass (N)		8	
Pubescent wheatgrass (I)			7
Indian ricegrass (sandy or sandy loam soils) (N)	2		
Thickspike wheatgrass (N)	7		2
Sheep fescue (I)		1	2
Basin wildrye (N)		1	
TOTAL	9	10	11
Seeds/sf/mixture	53	63	49

[a]Expressed as pure live seed

I = introduced, nonnative plant species

N = native plant species

sf = square feet

Table 7.6: Permanent Seed Mixes: Upland Areas With 15 to 18 Inches Precipitation shows two different erosion control seed mixes (A and B) for upland areas that receive 15 to 18 inches effective precipitation. For each, drilled seeding rates are given (in lb/acre); double seed rates if broadcast or hydroseeded. Consideration should be given to the traffic hazard for wildlife when selecting food species for roadside stabilization.

Table 7.6: Permanent Seed Mixes: Upland Areas With 15 to 18 Inches Precipitation

Common Name	Seeding Rate for Two Seed Mixes (lb/acre)[a]	
	A	B
Bluebunch wheatgrass (N) or beardless wheatgrass (N)	8	
Pubescent wheatgrass (I) or intermediate wheatgrass (I) or thickspike wheatgrass (N)		8
Hard fescue (I) or sheep fescue (I)	2	2
Big bluegrass (N)	1	1
Native legume (N)	2	2
TOTAL	9	10
Seeds/sf/mixture	70	72

[a]Expressed as pure live seed

I = introduced, nonnative plant species

N = native plant species

sf = square feet

Table 7.7: Permanent Seed Mixes: Upland Areas With 18 to 24 Inches Precipitation (continued) shows three different erosion control seed mixes (A, B, and C) for upland areas that receive 18 to 24 inches effective precipitation. For each, drilled seeding rates are given (in lb/acre); double seed rates if broadcast or hydroseeded. Consideration should be given to the traffic hazard for wildlife when selecting food species for roadside stabilization.

Table 7.7: Permanent Seed Mixes: Upland Areas With 18 to 24 Inches Precipitation

Common Name	Seeding Rate for Three Seed Mixes (lb/acre)[a]		
	A	B	C
Slender wheatgrass (N) or sodar streambank wheatgrass	7		
Blue wildrye (N)		8	
Mountain brome (N)	1		8
Hard fescue (I)	2	2	2
White clover (I) or red clover (I)			2

Table 7.7: Permanent Seed Mixes: Upland Areas With 18 to 24 Inches Precipitation (continued)

Common Name	Seeding Rate for Three Seed Mixes (lb/acre)[a]		
	A	B	C
Native lupine (N) or northern sweetvetch (N)		2	
Native clover spp. (N) or milkvetch spp. (N)	2		
TOTAL	12	12	12
Seeds/sf/mixture	64	62	76

[a]Expressed as pure live seed

I = introduced, nonnative plant species

N = native plant species

sf = square feet

Table 7.8: Permanent Seed Mixes: Upland Areas With More Than 24 Inches Precipitation (continued) shows two different erosion control seed mixes (A and B) for upland areas that receive > 24 inches effective precipitation. For each, drilled seeding rates are given (in lb/acre); double seed rates if broadcast or hydroseeded. Consideration should be given to the traffic hazard for wildlife when selecting food species for roadside stabilization.

Table 7.8: Permanent Seed Mixes: Upland Areas With More Than 24 Inches Precipitation

Common Name	Seeding Rate for Two Seed Mixes (lb/acre)[a]	
	A	B
Hard fescue (I)		2
Blue wildrye (N)	6	
Red fescue (I)	1	
Mountain brome (N)	2	4
Slender wheatgrass (N)		4
White clover (I)	2	
Native legume (N)		2
TOTAL	11	12

Table 7.8: Permanent Seed Mixes: Upland Areas With More Than 24 Inches Precipitation (continued)

Common Name	Seeding Rate for Two Seed Mixes (lb/acre)[a]	
	A	B
Seeds/sf/mixture	72	61

[a]Expressed as pure live seed

I = introduced, nonnative plant species

N = native plant species

sf = square feet

Table 7.9: Permanent Seed Mixes: Grassed Waterways With Fewer Than 15 Inches Precipitation shows three different erosion control seed mixes (A, B, and C) for stabilizing grassed waterways in areas that receive fewer than 15 inches effective precipitation. For each, drilled seeding rates are given (in lb/acre); double seed rates if broadcast or hydroseeded. Consideration should be given to the traffic hazard for wildlife when selecting food species for roadside stabilization.

Table 7.9: Permanent Seed Mixes: Grassed Waterways With Fewer Than 15 Inches Precipitation

Common Name	Seeding Rate for Three Seed Mixes (lb/acre)[a]		
	A	B	C
Pubescent wheatgrass (I)		10	
Streambank wheatgrass (N)			7
Thickspike wheatgrass (N)	7		
Sheep fescue (I)		2	2
Big bluegrass (N)	2		
TOTAL	9	12	9
Seeds/sf/mixture	66	48	56

[a]Expressed as pure live seed

I = introduced, nonnative plant species

N = native plant species

sf = square feet

Table 7.10: Permanent Seed Mixes: Grassed Waterways With 15 to 18 Inches Precipitation shows three different erosion control seed mixes (A, B, and C) for stabilizing grassed waterways in areas that receive 15 to 18 inches effective precipitation. For each, drilled seeding rates are given (in lb/acre); double seed rates if broadcast or hydroseeded. Consideration should be given to the traffic hazard for wildlife when selecting food species for roadside stabilization.

Table 7.10: Permanent Seed Mixes: Grassed Waterways With 15 to 18 Inches Precipitation

Common Name	Seeding Rate for Three Seed Mixes (lb/acre)[a]		
	A	B	C
Tall wheatgrass (I)	10		
Pubescent wheatgrass (I), streambank wheatgrass (N), or intermediate wheatgrass (I)		10	
Hard fescue (I) or sheep fescue (I)	2	2	2
Thickspike wheatgrass (N)			8
TOTAL	12	12	10
Seeds/sf/mixture	46	48	57

[a]Expressed as pure live seed

I = introduced, nonnative plant species

N = native plant species

sf = square feet

Table 7.11: Permanent Seed Mixes: Grassed Waterways With More Than 18 Inches Precipitation shows three different erosion control seed mixes (A, B, and C) for stabilizing grassed waterways in areas that receive more than 18 inches effective precipitation. For each, drilled seeding rates are given (in lb/acre); double seed rates if broadcast or hydroseeded. Consideration should be given to the traffic hazard for wildlife when selecting food species for roadside stabilization.

Table 7.11: Permanent Seed Mixes: Grassed Waterways With More Than 18 Inches Precipitation

Common Name	Seeding Rate for Three Seed Mixes (lb/acre)[a]		
	A	B	C
Intermediate wheatgrass (I)	10		
Mountain brome (N) or meadow brome		10	
Annual ryegrass (I) or perennial ryegrass (I)	4		
Hard fescue (I)		2	
Tall wheatgrass (I)			10
TOTAL	14	12	10
Seeds/sf/mixture	40	46	38

[a]Expressed as pure live seed

I = introduced, nonnative plant species

N = native plant species

sf = square feet

Table 7.12: Permanent Seed Mixes: Stabilization of Ski Slopes and Subalpine Areas (continued) shows two different erosion control seed mixes (A and B) for stabilizing ski slopes and subalpine areas in eastern Washington. For each, drilled seeding rates are given (in lb/acre); double seed rates if broadcast or hydroseeded. Consideration should be given to the traffic hazard for wildlife when selecting food species for roadside stabilization.

Table 7.12: Permanent Seed Mixes: Stabilization of Ski Slopes and Subalpine Areas

Common Name	Seeding Rate for Three Seed Mixes (lb/acre)[a]	
	A	B
Blue wildrye (N) or Idaho fescue (N)	10	
Pubescent wheatgrass (I) or red fescue (I)		8
Hard fescue (I)		5
Sheep fescue (I)	2	2
White clover (I) or bentgrasses (I)		2
Lupine (N)	2	

Table 7.12: Permanent Seed Mixes: Stabilization of Ski Slopes and Subalpine Areas (continued)

Common Name	Seeding Rate for Three Seed Mixes (lb/acre)[a]	
	A	B
TOTAL	14	17

[a]Expressed as pure live seed

I = introduced, nonnative plant species

N = native plant species

Roughening and Rototilling

- The seedbed should be firm and rough. Roughen all soil no matter what the slope. Track walk slopes before seeding if engineering purposes require compaction. Back-blading or smoothing of slopes > 4H:1V is not allowed if they are to be seeded.
- Restoration-based landscape practices require deeper incorporation than that provided by a simple single-pass rototilling treatment. Wherever practical, initially rip the subgrade to improve long-term permeability, infiltration, and water inflow qualities. At a minimum, permanent areas shall receive soil amendments to achieve organic matter and permeability performance defined in amended soil/landscape systems. For systems that are deeper than 8 inches, complete the rototilling process in multiple lifts, or prepare the soil amendments to achieve the specified depth.

Fertilizers

- Conducting soil tests to determine the exact type and quantity of fertilizer needed is recommended. This will prevent the overapplication of fertilizer.
- Organic matter is the most appropriate form of fertilizer because it provides nutrients (including nitrogen, phosphorus, and potassium) in the least water-soluble form. A natural system typically releases 20% to 10% of its nutrients annually. Chemical fertilizers have been formulated to simulate what organic matter does naturally.
- Always use slow-release fertilizers because they are more efficient and have fewer environmental impacts. Do not add fertilizer to the hydromulch machine, or agitate, more than 20 minutes before use. Too much agitation destroys the slow release coating.

There are numerous products available to take the place of chemical fertilizers, including several with seaweed extracts that are beneficial to soil microbes and organisms. If 100% cottonseed meal is used as the mulch in hydroseed, chemical fertilizer may not be necessary. Cottonseed meal provides a good source of long-term, slow-release, available nitrogen.

Bonded Fiber Matrix and Mechanically Bonded Fiber Matrix

- On steep slopes, use BFM or MBFM products. Apply BFM/MBFM products at a minimum rate of 3,000 lb per acre of mulch with approximately 10% tackifier. Achieve a minimum of 95% soil coverage during application. Numerous products are available commercially. Install products per manufacturer's instructions. Most products require 24 to 36 hours to cure before a rainfall and cannot be installed on wet or saturated soils. Generally, products come in 40- to 50-pound bags and include all necessary ingredients except for seed and fertilizer.
- BFMs and MBFMs provide good alternatives to blankets in most areas requiring vegetation establishment. Advantages over blankets include the following:
    - BFM and MBFMs do not require surface preparation.
    - Helicopters can assist in installing BFM and MBFMs in remote areas.
    - On slopes steeper than 2.5H:1V, blanket installers may require ropes and harnesses for safety.
    - Installing BFM and MBFMs can save at least $1,000 per acre compared to blankets.
- In most cases, the shear strength of blankets is not a factor when used on slopes, only when used in channels.
    - Areas to be permanently landscaped shall provide a healthy topsoil or amend the existing soil to reduce the need for fertilizers, improve overall topsoil quality, provide for better plant health and vitality, improve hydrologic characteristics, and reduce the need for irrigation.
    - Areas that already have good topsoil, such as undisturbed areas, do not require soil amendments.

Maintenance Standards

- Reseed any seeded areas that fail to establish ≥ 50% cover (100% cover for areas that receive sheet or concentrated flows) of all seeded areas after 3 months of active growth following germination during the growing season. If reseeding is ineffective, use an alternative method, such as sodding, mulching, or nets/blankets. If winter weather prevents adequate grass growth, this time limit may be relaxed at the discretion of the local authority when sensitive areas would otherwise be protected.
- Reseed and protect by mulch any areas that experience erosion after achieving adequate cover. If the erosion problem is drainage related, the problem shall be fixed and the eroded area reseeded and protected by mulch.
- Seeded areas shall be supplied with adequate moisture, but not watered to the extent that causes runoff.

Approved as Equivalent

The Washington State Department of Ecology (Ecology) has approved products as able to meet the requirements of BMP C120E: Temporary and Permanent Seeding. The products did not pass through the Technology Assessment Protocol–Ecology (TAPE) process. Local jurisdictions may choose not to accept this product approved as equivalent or may require additional testing prior to

consideration for local use. The products are available for review on Ecology's Emerging Stormwater Treatment Technologies (TAPE) web page at the following address:

https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Stormwater-permittee-guidance-resources/Emerging-stormwater-treatment-technologies

BMP C121E: Mulching

Purpose

The purpose of mulching soils is to provide immediate temporary protection from erosion. Mulch also enhances plant establishment by conserving moisture; holding fertilizer, seed, and topsoil in place; and moderating soil temperatures. There are a variety of mulches are available for use. Only the most common types are discussed in this section.

Conditions of Use

- As a temporary cover measure, mulch should be used:
    - For < 30 days on disturbed areas that require cover;
    - At all times for seeded areas, especially during the wet season and during the hot summer months; and
    - During the wet season on slopes steeper than 3H:1V with more than 10 feet of vertical relief.
- Mulch may be applied at any time of the year and must be refreshed periodically.
- For seeded areas, mulch may consist of 100% of the following:
    - Cottonseed meal
    - Fibers made of wood, recycled cellulose, hemp, or kenaf
    - Compost
    - A blend of these three materials
- Tackifier shall be plant-based, such as guar or *Alpha plantago*, or chemical-based such as polyacrylamide (PAM) or polymers. Any mulch or tackifier product used shall be installed per manufacturer's instructions. Generally, mulches come in 40- to 50-pound bags. Seed and fertilizer are added at time of application.

Design and Installation Specifications

For mulch materials, application rates, and specifications see Table 7.13: Mulch Standards and Guidelines (continued). Always use a minimum mulch thickness of 2 inches; increase the thickness until the ground is 95% covered (i.e., not visible under the mulch layer).

Note: Thicknesses may be increased for disturbed areas in or near sensitive areas or other areas highly susceptible to erosion.

Table 7.13: Mulch Standards and Guidelines

Mulch Material: Straw	
Quality Standards	Air-dried; free from undesirable seed and coarse material.
Application Rates	2- to 3 inches thick; five bales per 1,000 sf or 2 to 3 tons per acre
Remarks	Cost-effective protection when applied with adequate thickness. Hand-application generally requires greater thickness than blown straw. The thickness of straw may be reduced by half when used in conjunction with seeding. In windy areas, straw must be held in place by crimping, using a tackifier, or covering with netting. Blown straw always has to be held in place with a tackifier because even light winds will blow it away. Straw, however, has several deficiencies that should be considered when selecting mulch materials. It often introduces and/or encourages the propagation of weed species, and it has no significant long-term benefits. Straw should be used only if mulches with long-term benefits are unavailable locally. It should also not be used within the ordinary high-water elevation of receiving waters (due to flotation).
Mulch Material: Hydromulch	
Quality Standards	No growth inhibiting factors.
Application Rates	Approximately 25 to 30 lb per 1,000 sf or 1,000 to 1,300 lb per acre.
Remarks	Shall be applied with hydromulcher. Shall not be used without seed and tackifier unless the application rate is at least doubled. Fibers > 0.75 to 1 inch can clog hydromulch equipment. Fibers should be kept to < 0.75 inch.
Mulch Material: Compost	
Quality Standards	No visible water or dust during handling. Must be produced per Chapter 173-350 WAC, Solid Waste Handling Standards, but may have up to 35% biosolids.
Application Rates	2 inches thick at a minimum; approximately 100 tons per acre (approx. 750 lb per cubic yard).
Remarks	More effective control can be obtained by increasing thickness to 3 inches. Excellent mulch for protecting final grades until landscaping because it can be directly seeded or tilled into soil as an amendment. Compost used for mulch has a coarser size gradation than compost used for BMP C125E: Topsoiling/Composting or BMP F6.61: Amending Construction Site Soils. It is more stable and practical to use in wet areas and during rainy weather conditions. Do not use near wetlands or near phosphorus-impaired water bodies.
Mulch Material: Chipped Site Vegetation	
Quality Standards	Average size shall be several inches. Gradations from fines to 6 inches in length for texture, variation, and interlocking properties.
Application Rates	2 inches thick at a minimum.
Remarks	This is a cost-effective way to dispose of debris from clearing and grubbing, and it eliminates

Table 7.13: Mulch Standards and Guidelines (continued)

	the problems associated with burning. Generally, it should not be used on slopes above approximately 10% because of its tendency to be transported by runoff. It is not recommended within 200 feet of receiving waters. If seeding is expected shortly after mulch, the decomposition of the chipped vegetation may tie up nutrients important to grass establishment.
Mulch Material: Wood-Based Mulch or Wood Straw	
Quality Standards	No visible water or dust during handling. Must be purchased from a supplier with a Solid Waste Handling Permit or one exempt from solid waste regulations.
Application Rates	2 inches thick; approximately 100 tons per acre (approximately 750 lb per cubic yard).
Remarks	This material is often called "hog or hogged fuel." It is usable as a material for BMP C105E: Stabilized Construction Access and as a mulch. The use of mulch ultimately improves the organic matter in the soil. Special caution is advised regarding the source and composition of wood-based mulch. Its preparation typically does not provide any weed seed control, so evidence of residual vegetation in its composition or known inclusion of weed plants or seeds should be monitored and prevented (or minimized).
Mulch Material: Wood Strand Mulch	
Quality Standards	A blend of loose, long, thin wood pieces derived from native conifers or deciduous trees with high length-to-width ratio.
Application Rates	2 inches thick at a minimum.
Remarks	Cost-effective protection when applied with adequate thickness. A minimum of 95% of the wood strand shall have lengths between 2 and 10 inches, with a width and thickness between 1/16 and 0.5 inches. The mulch shall not contain resin, tannin, or other compounds in quantities that would be detrimental to plant life. Sawdust or wood shavings shall not be used as mulch. See the latest version of the Washington State Department of Transportation *Standard Specifications for Road, Bridge, and Municipal Construction*.

Where the option of "compost" is selected, it should be a coarse compost that meets the size gradations listed in Table 7.14: Size Gradations of Compost as Mulch Material when tested in accordance with Test Method 02.02-B in *Test Methods for the Examination of Composting and Compost* (Thompson, 2001).

Table 7.14: Size Gradations of Compost as Mulch Material

Sieve Size	Percentage Passing
3 inch	100
1 inch	90 to 100
3/4 inch	70 to 100
1/4 inch	40 to 100

Mulch used within the ordinary high-water mark of receiving waters should be selected to minimize potential flotation of organic matter. Composted organic materials have higher specific gravities (densities) than straw, wood, or chipped material. Consult the Hydraulic Project Approval (HPA) for mulch mixes if applicable.

Maintenance Standards

- The thickness of the mulch cover must be maintained.
- Any areas that experience erosion shall be remulched and/or protected with a net or blanket. If the erosion problem is drainage related, then the problem shall be fixed and the eroded area remulched.

BMP C122E: Nets and Blankets

Purpose

Erosion control nets and blankets are intended to prevent erosion and hold seed and mulch in place on steep slopes and in channels so that vegetation can become well established. In addition, some nets and blankets can be used to permanently reinforce turf to protect drainage systems during high flows.

Nets (commonly called matting) are strands of material woven into an open but high-tensile strength net (for example, coconut fiber matting and turf reinforcement mats [TRM]). Blankets are strands of material that are not tightly woven but instead form a layer of interlocking fibers, typically held together by a biodegradable or photodegradable netting (for example, excelsior or straw blankets). They generally have lower tensile strength than nets but cover the ground more completely. Coir (coconut fiber) fabric comes as both nets and blankets.

Conditions of Use

Erosion control nets and blankets should be used for the following purposes:

- To aid permanent vegetated stabilization of slopes 2H:1V or greater and with more than 10 feet of vertical relief.
- For drainage ditches and swales (highly recommended). The application of appropriate netting or blanket to drainage ditches and swales can protect bare soil from channelized runoff while vegetation is established. Nets and blankets also can capture a great deal of sediment due to their open, porous structure. Synthetic nets and blankets can be used to permanently stabilize channels and may provide a cost-effective, environmentally preferable alternative to riprap. 100% synthetic blankets manufactured for use in ditches may be easily reused as temporary ditch liners.

Disadvantages of nets and blankets include the following:

- Surface preparation is required.
- On slopes steeper than 2.5H:1V, net and blanket installers may need to be roped and harnessed for safety.
- They cost at least $4,000 to $6,000 per acre installed.

BMP C123E: Plastic Covering

Purpose

Plastic covering provides immediate, short-term erosion protection to slopes and disturbed areas.

Conditions of Use

Plastic covering may be used on disturbed areas that require cover measures for < 30 days, with the following exceptions:

- Plastic is particularly useful for protecting cut-and-fill slopes and stockpiles. However, the relatively rapid breakdown of most polyethylene sheeting makes it unsuitable for applications > 6 months.
- Due to rapid runoff caused by plastic covering, do not use this method upslope of areas that might be adversely impacted by concentrated runoff. Such areas include steep and/or unstable slopes.
- Plastic sheeting may result in increased runoff volumes and velocities, requiring additional on-site measures to counteract the increases. Creating a trough with wattles or other material can convey clean water away from these areas.
- To prevent undercutting, trench and backfill plastic covering that comes in a rolled form.
- Although the plastic material is inexpensive to purchase, the cost of installation, maintenance, removal, and disposal add to the total costs of this BMP.
- Whenever plastic is used to protect slopes, install water collection measures at the base of the slope. These measures include plastic-covered berms, channels, and pipes used to convey clean rainwater away from bare soil and disturbed areas. Do not mix clean runoff from a plastic covered slope with dirty runoff from a project.
- Other uses for plastic include the following:
    - Temporary ditch liner
    - Pond liner in temporary sediment pond
    - Liner for bermed temporary fuel storage area if plastic is not reactive to the type of fuel being stored
    - Emergency slope protection during heavy rains
    - Temporary drainpipe (“elephant trunk”) used to direct water

Design and Installation Specifications

- Plastic slope cover must be installed according to the following procedure:
    1. Run plastic up and down the slope, not across the slope.
    2. Plastic may be installed perpendicular to slope if the slope length < 10 feet.

3. Provide a minimum overlap of 8 inches at the seams.
4. On long or wide slopes, or slopes subject to wind, tape all seams.
5. Place plastic into a small (12-inch-wide by 6-inch-deep) slot trench at the top of the slope and backfill with soil to keep water from flowing underneath.
6. Place sand-filled burlap or geotextile bags every 3 to 6 feet along seams and tie them together with twine to hold them in place.
7. Inspect plastic for rips, tears, and open seams regularly and repair immediately. This prevents high-velocity runoff from contacting bare soil, which causes extreme erosion.
8. Sandbags may be lowered into place tied to ropes. However, all sandbags must be staked in place.

- Plastic sheeting shall have a minimum thickness of 0.06 millimeters.
- If erosion at the toe of a slope is likely, a gravel berm, riprap, or other suitable protection shall be installed at the toe of the slope in order to reduce the velocity of runoff.

Maintenance Standards

- Torn sheets must be replaced and open seams repaired.
- Completely remove and replace the plastic if it begins to deteriorate due to ultraviolet radiation.
- Completely remove plastic when no longer needed.
- Dispose of old tires used to weight down plastic sheeting appropriately.

Approved as Functionally Equivalent

The Washington State Department of Ecology (Ecology) has approved products as able to meet the requirements of this BMP. The products did not pass through the Technology Assessment Protocol–Ecology (TAPE) process. Local jurisdictions may choose not to accept these products or may require additional testing prior to consideration for local use. The products that Ecology has approved as functionally equivalent are available for review on Ecology's Emerging Stormwater Treatment Technologies (TAPE) web page at the following address:

https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Stormwater-permittee-guidance-resources/Emerging-stormwater-treatment-technologies

BMP C124E: Sodding

Purpose

The purpose of sodding is to establish permanent turf for immediate erosion protection and to stabilize drainage paths where concentrated overland flow will occur.

Conditions of Use

Sodding may be used in the following areas:

- The PAM anionic charge density may vary from 2% to 30%; a value of 18% is typical. Studies conducted by the U.S. Department of Agriculture (USDA), Agricultural Research Service demonstrated that soil stabilization was optimized by using very high molecular weight (12 to 15 milligrams (mg)/mole), highly anionic (> 20% hydrolysis) PAM.
- PAM tackifiers are available and being used in place of guar and alpha plantago. Typically, PAM tackifiers should be used at a rate of no more than 0.5 to 1 pound per 1,000 gallons of water in a hydromulch machine. Some tackifier product instructions say to use at a rate of 3 to 5 pounds per acre, which can be too much. In addition, pump problems can occur at higher rates due to increased viscosity.

Maintenance Standards

- PAM may be reapplied on actively worked areas after a 48-hour period.
- Reapplication is not required unless PAM-treated soil is disturbed or unless turbidity levels show the need for an additional application. If PAM-treated soil is left undisturbed, a reapplication may be necessary after 2 months. More PAM applications may be required for steep slopes, silty and clayey soils (USDA Classification Type “C” and “D” soils), long grades, and high precipitation areas. When PAM is applied first to bare soil and then covered with straw, a reapplication may not be necessary for several months.
- Loss of sediment and PAM may be a basis for penalties per RCW 90.48.080.

BMP C130E: Surface Roughening

Purpose

Surface roughening aids in the establishment of vegetative cover, reduces runoff velocity, increases infiltration, and provides for sediment trapping through the provision of a rough soil surface. Horizontal depressions are created by operating a tiller or other suitable equipment on the contour or by leaving slopes in a roughened condition by not fine grading them.

For more information: Use this BMP in conjunction with other BMPs such as BMP C120E: Temporary and Permanent Seeding, BMP C121E: Mulching, or BMP C124E: Sodding.

Conditions for Use

- All slopes > 3H:1V and > 5 vertical feet require surface roughening to a depth of 2 to 4 inches prior to seeding.
- Areas that will not be stabilized immediately may be roughened to reduce runoff velocity until seeding takes place.
- Slopes with a stable rock face do not require roughening.
- Slopes where mowing is planned should not be excessively roughened.

Design and Installation Specifications

There are different methods for achieving a roughened soil surface on a slope, and the selection of an appropriate method depends on the type of slope. Roughening methods include stair-step

grading, grooving, contour furrows, and tracking. See Figure 7.7: Surface Roughening by Tracking and Contour Furrows for tracking and contour furrows. Factors to be considered in choosing a roughening method are slope steepness, mowing requirements, and whether the slope is formed by cutting or filling.

- Disturbed areas that will not require mowing may be stair-step graded, grooved, or left rough after filling.
- Stair-step grading is particularly appropriate in soils containing large amounts of soft rock. Each “step” catches material that sloughs from above, and provides a level site where vegetation can become established. Stairs should be wide enough to work with standard earth moving equipment. Stair steps must be on contour or gullies will form on the slope.
- Areas that will be mowed (these areas should have slopes less steep than 3:1) may have small furrows left by disking, harrowing, raking, or seed-planting machinery operated on the contour.
- Graded areas with slopes > 3H:1V but < 2H:1V should be roughened before seeding. This can be accomplished in a variety of ways, including “track walking,” or driving a crawler tractor up and down the slope, leaving a pattern of cleat imprints parallel to slope contours.
- Tracking is done by operating equipment up and down the slope to leave horizontal depressions in the soil.

Maintenance Standards

- Areas that are surface roughened should be seeded as quickly as possible.
- Regular inspections should be made of the area. If rills appear, they should be re-roughened and reseeded immediately.

BMP C140E: Dust Control

Purpose

Dust control prevents wind transport of dust from disturbed soil surfaces onto roadways, into drainage systems, and into receiving waters. Wind erosion is a significant cause of soil movement from construction sites in eastern Washington. Although wind erosion can contribute to water quality impacts, dust control is regulated in some areas of eastern Washington primarily through local air quality authorities. Where such an entity exists, contact the local air quality authority for appropriate and required BMPs for dust control to implement at your project site.

Conditions for Use

Use dust control in areas (including roadways) subject to surface and air movement of dust where on-site or off-site impacts on roadways, drainage systems, or receiving waters are likely.

Design and Installation Specifications

- Vegetate or mulch areas that will not receive vehicle traffic. In areas where planting, mulching, or paving is impractical, apply gravel or landscaping rock.
- Limit dust generation by clearing only those areas where immediate activity will take place, leaving the remaining area(s) in the original condition, if stable. Maintain the original ground cover as long as practical.
- Construct natural or artificial windbreaks or windscreens. These may be designed as enclosures for small dust sources.
- Sprinkle the site with water until the surface is wet. Repeat as needed. To prevent carryout of mud onto the street, see BMP C105E: Stabilized Construction Access and BMP C106E: Wheel Wash.
- Irrigation water can be used for dust control. Irrigation systems should be installed as a first step on sites where dust control is a concern.
- Spray exposed soil areas with a dust palliative, following the manufacturer's instructions and cautions regarding handling and application. Used oil is prohibited from use as a dust suppressant. Local jurisdictions may approve other dust palliatives such as calcium chloride or polyacrylamide (PAM).
- PAM (BMP C126E: Polyacrylamide for Soil Erosion Protection) added to water at a rate of 0.5 pounds per 1,000 gallons of water per acre and applied from a water truck is more effective than water alone. This is due to the increased infiltration of water into the soil and reduced evaporation. In addition, small soil particles are bonded together and are not as easily transported by wind. Adding PAM may reduce the quantity of water needed for dust control, especially in eastern Washington. PAM should not be directly applied to water or allowed to enter a water body.
- Contact your local air pollution control authority for guidance and training on other dust control measures. Compliance with the local air pollution control authority constitutes compliance with this BMP. See the following website for more information:

https://ecology.wa.gov/About-us/Our-role-in-the-community/Partnerships-committees/Clean-air-agencies

- Use vacuum street sweepers.
- Remove mud and other dirt promptly so it does not dry and then turn into dust.

Techniques that can be used for unpaved roads and lots include the following:

- Reduce speed limits. High vehicle speed increases the amount of dust stirred up from unpaved roads and lots.
- Upgrade the road surface strength by improving particle size, shape, and mineral types that make up the surface and base materials.
- Add surface gravel to reduce the source of dust emission. Limit the amount of fine particles < 0.075 millimeters to 10% to 20%.
- Use geotextile fabrics to increase the strength of new roads or roads undergoing reconstruction.
- Encourage the use of alternate, paved routes, if available.
- Apply chemical dust suppressants using the admix method, blending the product with the top few inches of surface material. Suppressants may also be applied as surface treatments.
- Limit dust-generating work on windy days.
- Pave unpaved permanent roads and other trafficked areas.

Maintenance Standards

Respray area as necessary to keep dust to a minimum.

BMP C150E: Materials on Hand

Purpose

Quantities of erosion prevention and sediment control materials can be kept on the project site at all times to be used for emergency situations such as unexpected heavy rains. Having these materials on-site reduces the time needed to replace existing or implement new BMPs when inspections indicate that existing BMPs are not meeting the Construction Stormwater Pollution Prevention Plan (SWPPP) requirements. In addition, contractors can save money by buying some materials in bulk and storing them at their office or yard.

Conditions for Use

- Construction projects of any size or type can benefit from having materials on hand. A small commercial development project could have a roll of plastic and some gravel available for immediate protection of bare soil and temporary berm construction. A large earthwork project, such as highway construction, might have several tons of straw, several rolls of plastic, flexible pipe, sandbags, geotextile fabric and steel “T” posts.

BMP C160E: Certified Erosion and Sediment Control Lead

Purpose

The project proponent designates at least one person as the responsible representative in charge of erosion and sediment control (ESC) and water quality protection. The designated employee or contact shall be the Certified Erosion and Sediment Control Lead (CESCL) who is responsible for ensuring compliance with all local, state, and federal ESC and water quality requirements.

Conditions of Use

A CESCL should be made available on projects ≥ 1 acre that discharge stormwater to surface waters of the state. Sites < 1 acre do not require a CESCL certification for conducting inspections; sampling is not required on sites that disturb < 1 acre. The CESCL shall meet one of the following requirements:

- Have a current certificate proving attendance in an ESC training course that meets the minimum ESC training and certification requirements established by Ecology. The minimum requirements for CESCL course training, as well as a list of ESC training and certification providers, are available on the Washington State Department of Ecology's Certified Erosion & Sediment Control Lead web page at the following address:

  https://ecology.wa.gov/Regulations-Permits/Permits-certifications/Certified-erosion-sediment-control

- Be a Certified Professional in Erosion and Sediment Control (CPESC). For additional information, see the Envirocert CPESC website at the following address:

  http://apps.leg.wa.gov/WAC/default.aspx

Specifications

- CESCL certification shall remain valid for 3 years.
- The CESCL shall have authority to act on behalf of the contractor or developer and shall be available, on call, 24 hours per day throughout the period of construction.
- The Construction Stormwater Pollution Prevention Plan (SWPPP) shall include the name, telephone number, fax number, and address of the designated CESCL. See Chapter 3 - Preparation of Stormwater Site Plans and 7.2 Planning.
- A CESCL may provide inspection and compliance services for multiple construction projects in the same geographic region.
- Duties and responsibilities of the CESCL shall include, but are not limited to, the following:
  - Maintaining a permit file on-site at all times, which includes the SWPPP and any associated permits and plans
  - Directing BMP installation, inspection, maintenance, modification, and removal
  - Updating all project drawings and the Construction SWPPP with changes made

- Completing any sampling requirements including reporting results using electronic Discharge Monitoring Reports (WebDMR)
- Facilitating, participating in, and taking corrective actions resulting from inspections performed by outside agencies or the owner
- Keeping daily logs, and inspection reports. Inspection reports should include the following:
    - Inspection date/time
    - Weather information; general conditions during inspection and approximate amount of precipitation since the last inspection
    - Visual monitoring results, including a description of discharged stormwater and a notation of the presence of suspended sediment, turbid water, discoloration, and oil sheen, as applicable
    - Any water quality monitoring performed during inspection
    - General comments and notes, including a brief description of any BMP repairs, maintenance, or installations made as a result of the inspection
    - A summary or list of all BMPs implemented, including observations of all ESC structures or practices and the following:
        1. Locations of BMPs inspected
        2. Locations of BMPs that need maintenance
        3. Locations of BMPs that failed to operate as designed or intended
        4. Locations where additional or different BMPs are required

BMP C162E: Scheduling

Purpose

Sequencing a construction project can reduce the amount and duration of soil exposed to erosion by wind, rain, runoff, and vehicle tracking.

Conditions for Use

The construction sequence schedule is an orderly listing of all major land-disturbing activities together with the necessary erosion and sediment control (ESC) BMPs planned for the project. This type of schedule guides the contractor on work to be done before other work is started so that serious erosion and sedimentation problems can be avoided.

Following a specified work schedule that coordinates the timing of land-disturbing activities and the installation of control measures is perhaps the most cost-effective way of controlling erosion during construction. The removal of ground cover leaves a site vulnerable to erosion. Construction

- For outlets at the base of steep slope pipes (pipe slope > 10%), use an engineered energy dissipater.
- Geotextile or erosion control blankets should always be used under riprap to prevent scour and channel erosion. See BMP C122E: Nets and Blankets.

- Bank stabilization, bioengineering, and habitat features may be required for disturbed areas. This work may require a Hydraulic Project Approval (HPA) from the Washington State Department of Fish and Wildlife.

  For more information: See 1.4.9 Hydraulic Project Approvals.

Maintenance Standards

- Inspect and repair as needed.
- Add rock as needed to maintain the intended function.
- Clean energy dissipater if sediment builds up.

BMP C220E: Inlet Protection

Purpose

Inlet protection prevents coarse sediment from entering drainage systems prior to permanent stabilization of the disturbed area.

Conditions of Use

Use inlet protection at inlets that are operational before permanent stabilization of the disturbed areas that contribute runoff to the inlet. Provide protection for all storm drain inlets downslope and within 500 feet of a disturbed or construction area, unless those inlets are preceded by a sediment–trapping BMP.

Also consider inlet protection for lawn and yard drains on new home construction. These small and numerous drains coupled with lack of gutters can add significant amounts of sediment into the roof drain system. If possible, delay installing lawn and yard drains until just before landscaping, or cap these drains to prevent sediment from entering the system until completion of landscaping. Provide 18 inches of sod around each finished lawn and yard drain.

Table 7.18: Storm Drain Inlet Protection lists several options for inlet protection. All of the methods for inlet protection tend to become plugged and require a high frequency of maintenance. Limit contributing areas for an individual inlet to ≤ 1 acre. If possible, provide emergency overflows with additional end-of-pipe treatment where stormwater ponding would cause a hazard.

Table 7.18: Storm Drain Inlet Protection

Type of Inlet Protection	Emergency Overflow	Applicable for Paved/ Earthen Surfaces	Conditions of Use
Drop Inlet Protection			
Excavated drop inlet protection	Yes, temporary flooding will occur	Earthen	Applicable for heavy flows. Easy to maintain. Large area requirement: 30-feet by 30-feet/acre
Block and gravel drop inlet protection	Yes	Paved or earthen	Applicable for heavy concentrated flows. Will not pond.
Gravel and wire drop inlet protection	No	Paved or earthen	Applicable for heavy concentrated flows. Will pond. Can withstand traffic.
Catch basin filters	Yes	Paved or earthen	Frequent maintenance required.
Curb Inlet Protection			
Curb inlet protection with a wooden weir	Small capacity overflow	Paved	Used for sturdy, more compact installation.
Block and gravel curb inlet protection	Yes	Paved	Sturdy, but limited filtration.
Culvert Inlet Protection			
Culvert inlet sediment trap	Not applicable	Not applicable	18-month expected life.

Design and Installation Specifications

Excavated Drop Inlet Protection

Excavated drop inlet protection consists of an excavated impoundment around the storm drain inlet. Sediment settles out of the stormwater prior to entering the storm drain. Design and installation specifications for excavated drop inlet protection include:

- Provide a depth 1 to 2 feet as measured from the crest of the inlet structure.
- Side slopes of excavation should be ≤ 2H:1V.
- Minimum volume of excavation is 35 cubic yards.
- Shape the excavation to fit the site, with the longest dimension oriented toward the longest inflow area.
- Install provisions for draining to prevent standing water.
- Clear the area of all debris.
- Grade the approach to the inlet uniformly.

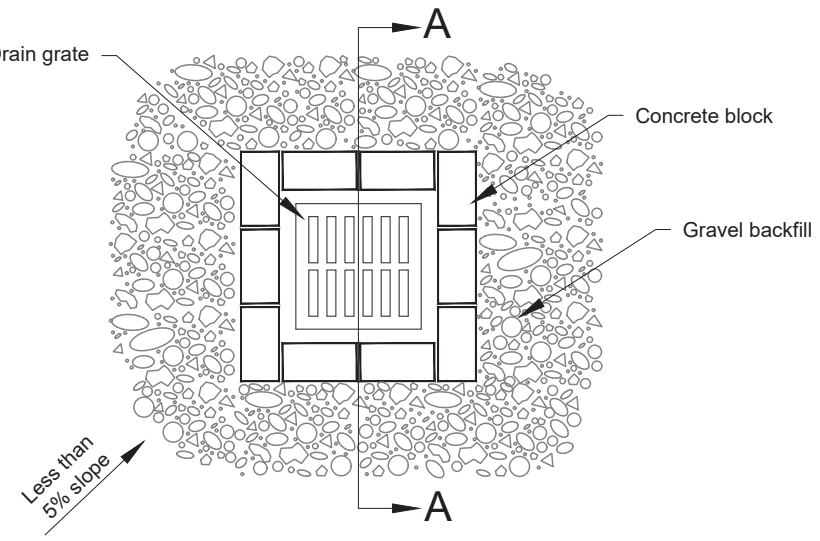
- Drill weep holes into the side of the inlet.
- Protect weep holes with screen wire and washed aggregate.
- Seal weep holes when removing structure and stabilizing area.
- Build a temporary dike, if necessary, to the downslope side of the structure to prevent bypass flow.

Block and Gravel Filter

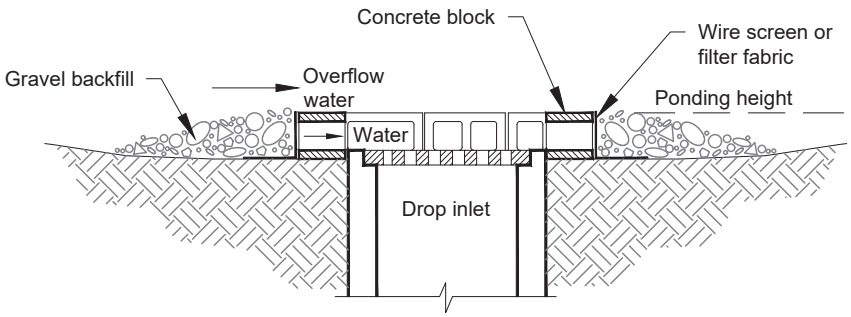
A block and gravel filter is a barrier formed around the inlet with standard concrete blocks and gravel. See Figure 7.19: Block and Gravel Filter. Design and installation specifications for block and gravel filters include:

- Provide a height 1 to 2 feet above the inlet.
- Recess the first row of blocks 2 inches into the ground for stability.
- Support subsequent courses by placing a piece of pressure-treated wood (2x4) through the block opening.
- Do not use mortar.
- Lay some blocks in the bottom row on their side to allow for dewatering the pool.
- Place hardware cloth or comparable wire mesh with 0.5-inch openings over all block openings.
- Place gravel to just below the top of blocks on slopes of 2H:1V or flatter.
- An alternative design is a gravel berm surrounding the inlet, as follows:
    - Provide a slope of 3H:1V on the upstream side of the berm.
    - Provide a slope of 2H:1V on the downstream side of the berm.
    - Provide a 1-foot-wide level rock area between the gravel berm and the inlet.
    - Use rocks ≥ 3 inches in diameter on the upstream slope of the berm.
    - Use gravel with a diameter of 0.5 to 0.75 inches at a minimum thickness of 1 foot on the downstream slope of the berm.

Figure 7.19: Block and Gravel Filter



Plan View



Section A-A

Notes:

1. Drop inlet sediment barriers are to be used for small, nearly level drainage areas. (less than 5%)
2. Excavate a basin of sufficient size adjacent to the drop inlet.
3. The top of the structure (ponding height) must be well below the ground elevation downslope to prevent runoff from bypassing the inlet. A temporary dike may be necessary on the downslope side of the structure.

NOT TO SCALE

DEPARTMENT OF
ECOLOGY
State of Washington

Block and Gravel Filter

Revised June 2016

Gravel and Wire Mesh Filter

Gravel and wire mesh filters are gravel barriers placed over the top of the inlet. This method does not provide an overflow. Design and installation specifications for gravel and wire mesh filters include:

- Use a hardware cloth or comparable wire mesh with 0.5-inch openings.
    - Place wire mesh over the drop inlet so that the wire extends a minimum of 1 foot beyond each side of the inlet structure.
    - Overlap the strips if more than one strip of mesh is necessary.
- Place coarse aggregate over the wire mesh.
    - Provide ≥ 12-inch depth of aggregate over the entire inlet opening and extend ≥ 18 inches on all sides.

Catch Basin Filters

Catch basin filters are designed by manufacturers for construction sites. The limited sediment storage capacity increases the amount of inspection and maintenance required, which may be daily for heavy sediment loads. To reduce maintenance requirements, combine a catch basin filter with another type of inlet protection. This combined inlet protection provides flow bypass without overflow and therefore may be a better method for inlets located along active rights-of-way. Design and installation specifications for catch basin filters include:

- Provide 5 cubic feet of storage.
- Require dewatering provisions.
- Provide a high-flow bypass that will not become clogged under normal use at a construction site.
- Insert the catch basin filter in the catch basin just below the grating.

Curb Inlet Protection With Wooden Weir

Curb inlet protection with wooden weir is an option that consists of a barrier formed around a curb inlet with a wooden frame and gravel. Design and installation specifications for curb inlet protection with wooden weirs include:

- Use wire mesh with 0.5-inch openings.
- Use extra strength filter cloth.
- Construct a frame.
- Attach the wire and filter fabric to the frame.
- Pile coarse washed aggregate against the wire and fabric.
- Place weight on the frame anchors.

Block and Gravel Curb Inlet Protection

Block and gravel curb inlet protection is a barrier formed around a curb inlet with concrete blocks and gravel. See Figure 7.20: Block and Gravel Curb Inlet Protection. Design and installation specifications for block and gravel curb inlet protection include:

- Use wire mesh with 0.5-inch openings.
- Place two concrete blocks on their sides abutting the curb at either side of the inlet opening. These are spacer blocks.
- Place a 2x4 stud through the outer holes of each spacer block to align the front blocks.
- Place blocks on their sides across the front of the inlet and abutting the spacer blocks.
- Place wire mesh over the outside vertical face.
- Pile coarse aggregate against the wire to the top of the barrier.

Curb and Gutter Sediment Barrier

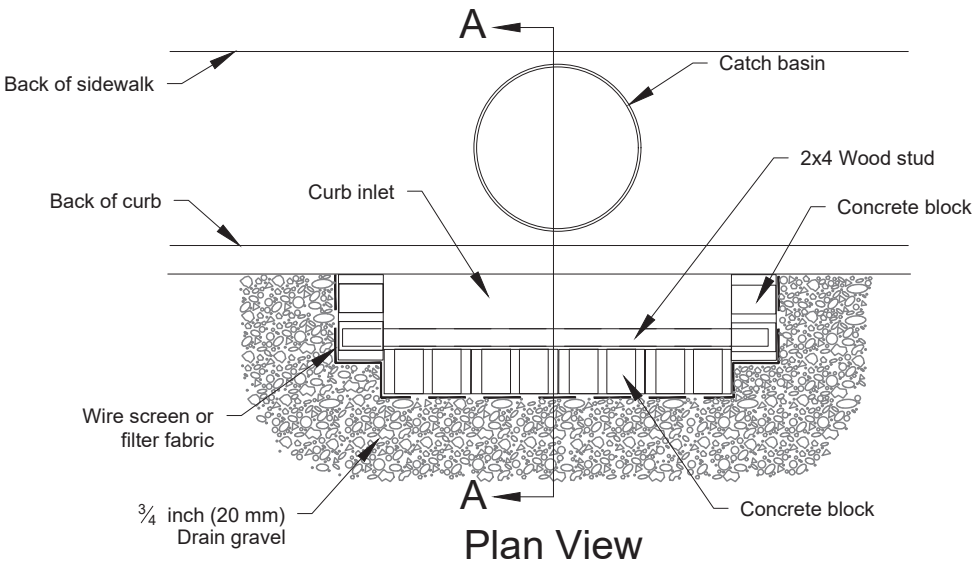
A curb and gutter sediment barrier is a sandbag or rock berm (riprap and aggregate) 3 feet high and 3 feet wide in a horseshoe shape. See Figure 7.21: Curb and Gutter Barrier. Design and installation specifications for curb and sediment barriers include:

- Construct a horseshoe-shaped berm, faced with coarse aggregate if using riprap, 3 feet high and 3 feet wide, ≥ 2 feet from the inlet.
- Construct a horseshoe-shaped sedimentation trap on the upstream side of the berm. Size the trap to sediment trap standards for protecting a culvert inlet.

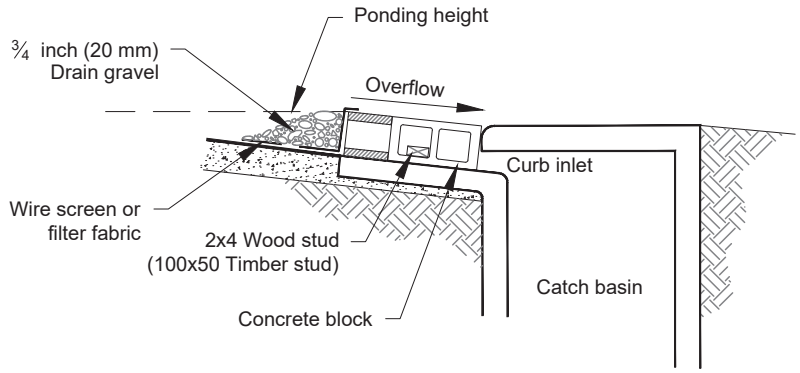
Maintenance Standards

- Inspect all forms of inlet protection frequently, especially after storm events. Clean and replace clogged catch basin filters. For rock and gravel filters, pull, away the rocks from the inlet and clean or replace. An alternative approach is to use the clogged rock as fill and put fresh rock around the inlet.
- Do not wash sediment into storm drains while cleaning. Spread all excavated material evenly over the surrounding land area or stockpile and stabilize as appropriate.

Figure 7.20: Block and Gravel Curb Inlet Protection



Plan View



Section A-A

Notes:

1. Use block and gravel type sediment barrier when curb inlet is located in gently sloping street segment, where water can pond and allow sediment to separate from runoff.
2. Barrier shall allow for overflow from severe storm event.
3. Inspect barriers and remove sediment after each storm event. Sediment and gravel must be removed from the traveled way immediately.

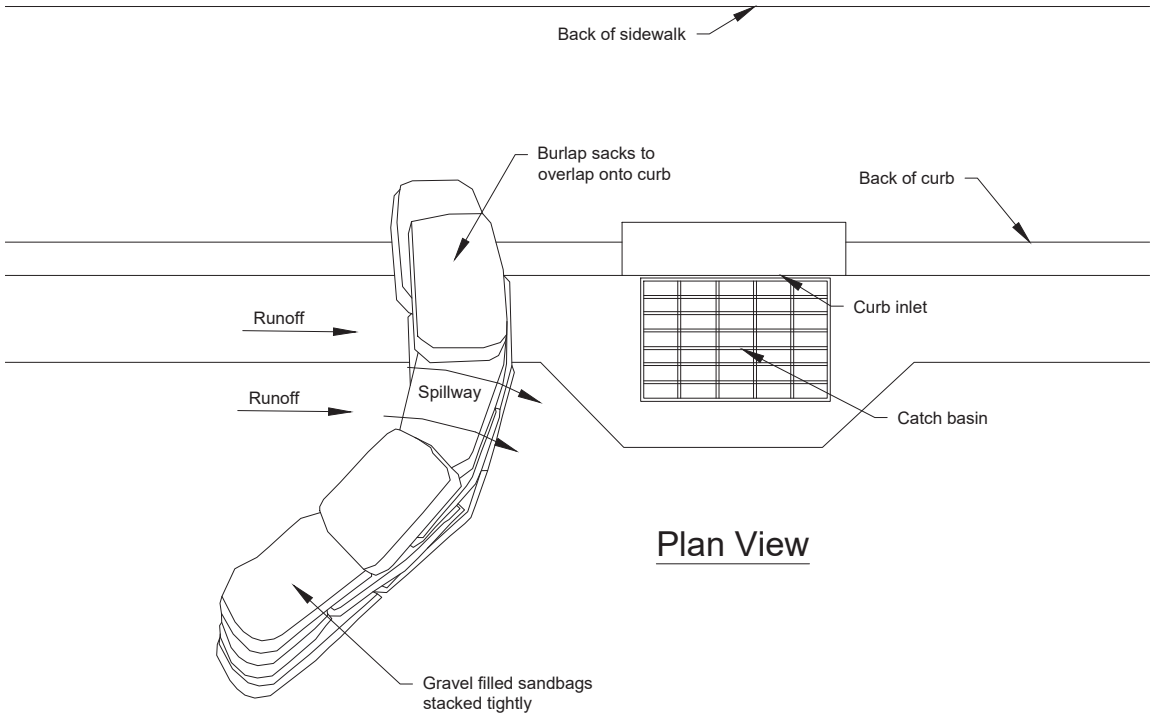
NOT TO SCALE

DEPARTMENT OF ECOLOGY
State of Washington

Block and Gravel Curb Inlet Protection

Revised June 2016

Figure 7.21: Curb and Gutter Barrier



Notes:

1. Place curb type sediment barriers on gently sloping street segments, where water can pond and allow sediment to separate from runoff.
2. Sandbags of either burlap or woven 'geotextile' fabric, are filled with gravel, layered and packed tightly.
3. Leave a one sandbag gap in the top row to provide a spillway for overflow.
4. Inspect barriers and remove sediment after each storm event. Sediment and gravel must be removed from the traveled way immediately.

NOT TO SCALE

DEPARTMENT OF ECOLOGY
State of Washington

Curb and Gutter Barrier

Revised June 2016

BMP C233E: Silt Fence

Purpose

Silt fence reduces the transport of coarse sediment from a construction site by providing a temporary physical barrier to sediment and reducing the runoff velocities of overland flow.

Conditions of Use

- Silt fence may be used downslope of all disturbed areas.
- Silt fence shall prevent sediment carried by runoff from going beneath, through, or over the top of the silt fence but shall allow the water to pass through the fence.
- Silt fence is not intended to treat concentrated flows, nor is it intended to treat substantial amounts of overland flow. Convey any concentrated flows through the drainage system to a sediment-trapping BMP.
- Do not construct silt fences in streams or use in V-shaped ditches. Silt fences do not provide an adequate method of silt control for anything deeper than sheet or overland flow.

Design and Installation Specifications

- Contributing area of ≤ 1 acre or in combination with sediment basin in a larger site.
- Use in combination with other construction stormwater BMPs.
- Maximum slope steepness (perpendicular to the silt fence line) of 1H:1V.
- Maximum sheet or overland flow path length to the silt fence of 100 feet.
- Do not allow flows > 0.5 cubic feet per second.
- Use geotextile fabric that meets the standards indicated in Table 7.19: Geotextile Fabric Standards for Silt Fence. All of the listed geotextile properties are minimum average roll values (i.e., the test result for any sampled roll in a lot shall meet or exceed the values shown in Table Table 7.19: Geotextile Fabric Standards for Silt Fence).

Table 7.19: Geotextile Fabric Standards for Silt Fence

Geotextile Property	Minimum Average Roll Value
Polymeric Mesh Apparent Opening Size (ASTM D4751)	0.60 mm maximum for slit film wovens (No. 30 sieve) 0.30 mm maximum for all other geotextile types (No. 50 sieve) 0.15 mm minimum for all fabric types (No. 100 sieve)
Water Permittivity (ASTM D4491)	0.02 sec-1 minimum
Grab Tensile Strength (ASTM D4632)	180 lb minimum for extra strength fabric 100 lb minimum for standard strength fabric
Grab Tensile Strength (ASTM D4632)	30% maximum
Ultraviolet Resistance (ASTM D4355)	70% minimum

- Support standard strength geotextiles shall be supported with wire mesh, chicken wire, 2- by 2-inch wire, safety fence, or jute mesh to increase the strength of the geotextile Silt fence materials are available that have synthetic mesh backing attached.
- Silt fence material shall contain ultraviolet ray inhibitors and stabilizers to provide a minimum of 6 months of expected usable construction life at a temperature range of 0°F to 120°F.
- 100% biodegradable silt fence is available that is strong, long lasting, and can be left in place after the project is completed, if permitted by the local jurisdiction.
- See Figure 7.24: Silt Fence. Include the following standard notes for silt fence on construction plans and specifications:

    1. The contractor shall install and maintain temporary silt fences at the locations shown in the plans.
    2. Construct silt fences in the areas of clearing, grading, or drainage prior to starting those activities.
    3. The silt fence shall have a 2-foot minimum and a 2.5-foot maximum height above the original ground surface.
    4. The geotextile fabric shall be sewn together at the point of manufacture to form fabric lengths as required. Locate all sewn seams at support posts. Alternatively, two sections of silt fence can be overlapped, provided the contractor can demonstrate, to the satisfaction of the licensed professional, that the overlap is long enough and that the adjacent silt fence sections are close enough together to prevent silt laden water from escaping through the fence at the overlap.
    5. Attach the geotextile fabric on the upslope side of the posts and secure with staples, wire, or in accordance with the manufacturer's recommendations. Attach the geotextile fabric to the posts in a manner that reduces the potential for tearing.
    6. Support the geotextile fabric with wire or plastic mesh, dependent on the properties of

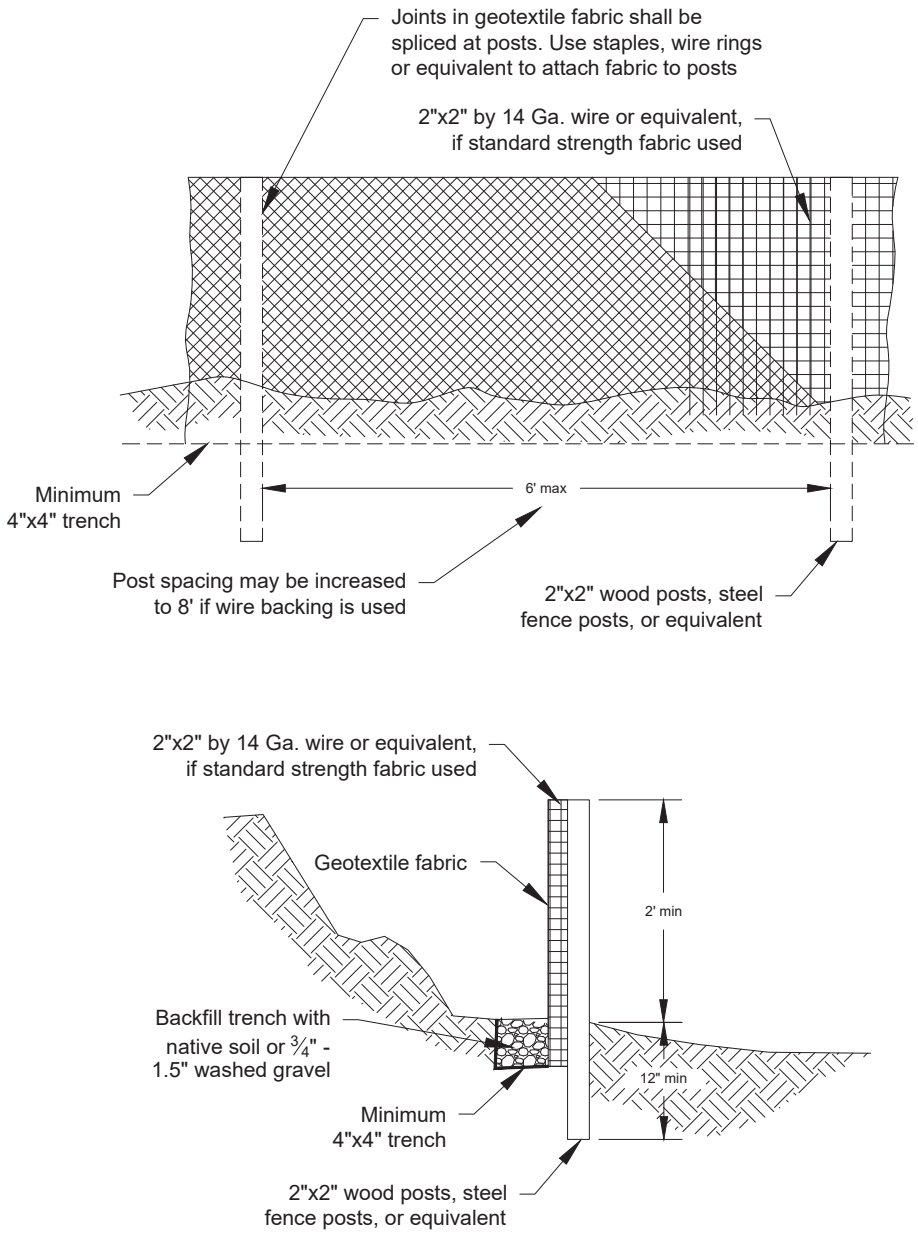
the geotextile selected for use. If wire or plastic mesh is used, fasten the mesh securely to the upslope of the posts with the geotextile fabric upslope of the mesh.

7. Mesh support, if used, shall consist of steel wire with a maximum mesh spacing of 2 inches, or a prefabricated polymeric mesh. The strength of the wire or polymeric mesh shall be ≥ 180 pounds grab tensile strength. The polymeric mesh must be as resistant to the same level of ultraviolet radiation as the geotextile fabric it supports.
8. Bury the bottom of the geotextile fabric 4 inches minimum below the ground surface. Backfill and tamp soil in place over the buried portion of the geotextile fabric, so that no flow can pass beneath the silt fence and scouring cannot occur. When wire or polymeric support mesh is used, the wire or polymeric mesh shall extend into the ground 3 inches minimum.
9. Drive or place the silt fence posts into the ground 18 inch minimum. A 12-inch minimum depth is allowed if topsoil or other soft subgrade soil is not present and 18 inches cannot be reached. Increase fence post minimum depths by 6 inches if the fence is located on slopes of ≥ 3H:1V and the slope is perpendicular to the fence. If required post depths cannot be obtained, the posts shall be adequately secured by bracing or guying to prevent overturning of the fence due to sediment loading.
10. Use wood, steel or equivalent posts. The spacing of the support posts shall be a maximum of 6 feet. Posts shall consist of one of the following:
    - Wood with minimum dimensions of 2 inches by 2 inches by 3 feet. Wood shall be free of defects such as knots, splits, or gouges.
    - No. 6 steel rebar or larger.
    - ASTM A120 steel pipe with a minimum diameter of 1 inch.
    - U-, T-, L-, or C-shaped steel posts with a minimum weight of 1.35 pounds per foot.
    - Other steel posts having strength and bending resistance equivalent to the post sizes listed above.
11. Locate silt fences on contour as much as possible, except at the ends of the fence, where the fence shall be turned uphill such that the silt fence captures the runoff water and prevents water from flowing around the end of the fence.
12. If the fence must cross contours, with the exception of the ends of the fence, place check dams perpendicular to the back of the fence to minimize concentrated flow and erosion. The slope of the fence line where contours must be crossed shall be ≤ 3H:1V.
    - Check dams shall be approximately 1 foot deep at the back of the fence and shall be continued perpendicular to the fence at the same elevation until the top of the check dam intercepts the ground surface behind the fence.
    - Check dams shall consist of crushed surfacing base course, gravel backfill for walls, or shoulder ballast and shall be located every 10 feet along the fence where the fence must cross contours.

- See Figure 7.25: Silt Fence Installation by Slicing Method for slicing method details. The following are specifications for silt fence installation using the slicing method:

    1. The base of both end posts must be ≥ 2 to 4 inches above the top of the geotextile fabric on the middle posts for ditch checks to drain properly. Use a hand level or string level, if necessary, to mark base points before installation.
    2. Install posts 3 to 4 feet apart in critical retention areas and 6 to 7 feet apart in standard applications.
    3. Install posts 24 inches deep on the downstream side of the silt fence, and as close as possible to the geotextile fabric, enabling posts to support the geotextile fabric from upstream water pressure.
    4. Install posts with the nipples facing away from the geotextile fabric.
    5. Attach the geotextile fabric to each post with three ties, all spaced within the top 8 inches of the fabric. Attach each tie diagonally 45 degrees through the fabric, with each puncture ≥ 1 inch vertically apart. Each tie should be positioned to hang on a post nipple when tightening to prevent sagging.
    6. Wrap approximately 6 inches of the geotextile fabric around the end posts and secure with three ties.
    7. No more than 24 inches of a 36-inch geotextile fabric is allowed above ground level.
    8. Compact the soil immediately next to the geotextile fabric with the front wheel of the tractor, skid steer, or roller exerting ≥ 60 pounds per square inch. Compact the upstream side first and then each side twice for a total of four trips. Check and correct the installation for any deviation before compaction. Use a flat-bladed shovel to tuck fabric deeper into the ground if necessary.

Figure 7.24: Silt Fence

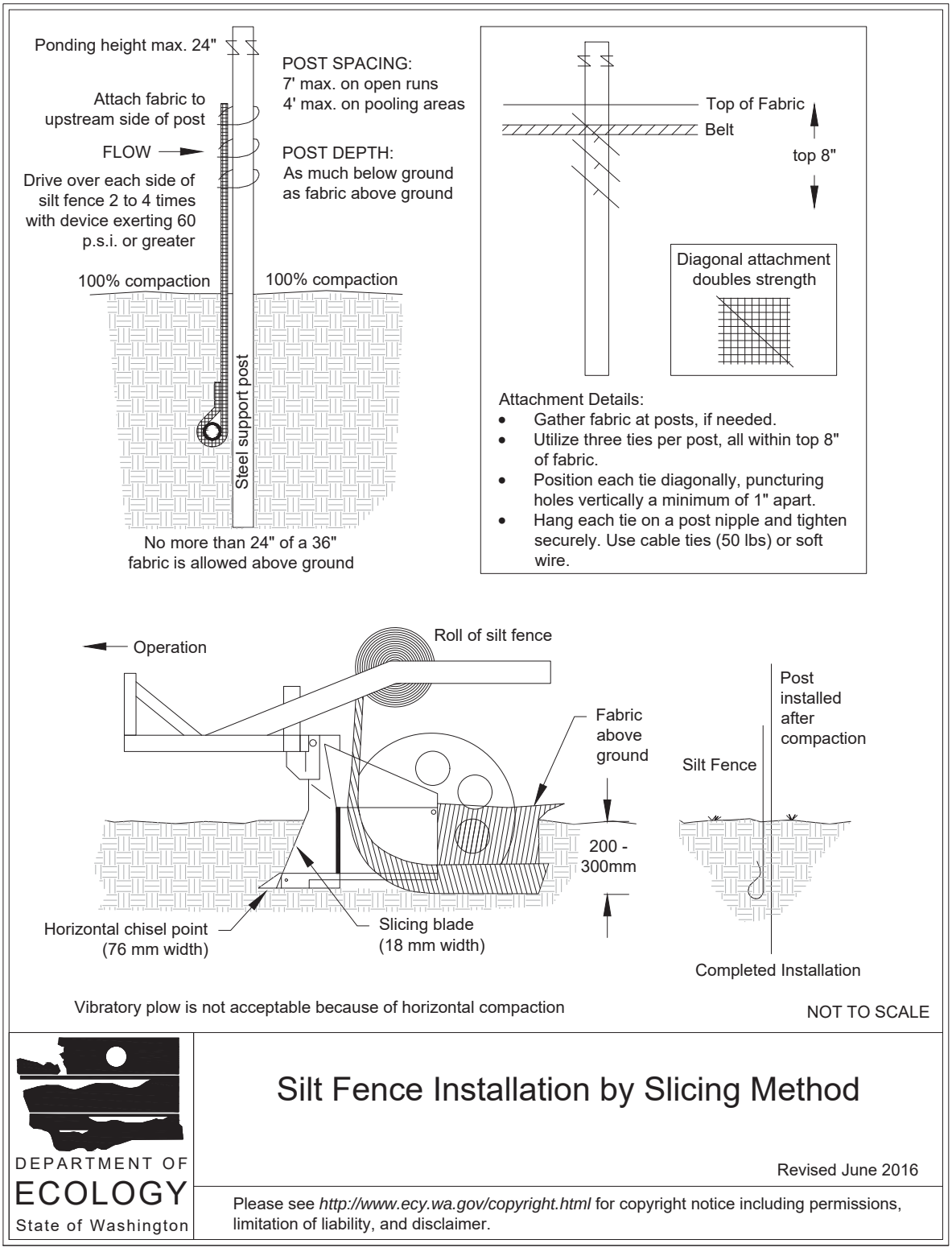


DEPARTMENT OF ECOLOGY
State of Washington

Silt Fence

Revised June 2016

Figure 7.25: Silt Fence Installation by Slicing Method



Maintenance Standards

- Repair any damage immediately.
- If concentrated flows are evident uphill of the fence, they must be intercepted and conveyed to a sediment-trapping BMP.
- It is important to check the uphill side of the silt fence for signs of the fence clogging and acting as a barrier to flow and then causing channelization of flows parallel to the fence. If this occurs, replace the fence and remove the trapped sediment.
- Remove sediments deposits when the deposit reaches approximately one-third the height of the silt fence, or install a second silt fence.
- Replace geotextile fabric that has deteriorated due to ultraviolet breakdown.

BMP C234E: Vegetated Strip

Purpose

Vegetated strips reduce the transport of coarse sediment from a construction site by providing a physical barrier to sediment and reducing the runoff velocities of overland flow.

Conditions of Use

- Vegetated strips may be used downslope of all disturbed areas.
- Vegetated strips are not intended to treat concentrated flows, nor are they intended to treat substantial amounts of overland flow. Any concentrated flows must be conveyed through the drainage system to BMP C241E: Sediment Pond (Temporary) or other sediment-trapping BMP. The only circumstance in which overland flow can be treated solely by a vegetated strip rather than a sediment-trapping BMP, is when the following criteria are met (see Table 7.20: Contributing Area for Vegetated Strips):

Table 7.20: Contributing Area for Vegetated Strips

Average Contributing Area Slope	Average Contributing Area Percentage Slope	Maximum Contributing Area Flow Path Length (feet)
≤ 1.5H:1V	≤ 67	100
≤ 2H:1V	≤ 50	115
≤ 4H:1V	≤ 25	150
≤ 6H:1V	≤ 16.7	200
≤ 10H:1V	≤ 10	250

Design and Installation Specifications

- The vegetated strip shall consist of a continuous strip of dense vegetation with topsoil for a minimum length of 25 feet along the flow path. Grass-covered, landscaped areas are generally not adequate because the volume of sediment overwhelms the grass. Ideally,

Exhibit 3

TESC Plans

Know what's **below.**
Call before you dig.

T.E.S.C LEGEND

- (SF) FILTER FABRIC FENCE — 1/3
- (CL) CLEARING LIMITS
- (CE) TEMP. CONSTRUCTION ENTRANCE — 3/3
- (IP) INLET SEDIMENT PROTECTION — 2/3
- (ID) INTERCEPTOR DITCH SLOPE VARIES (TYP.)

KEYNOTES

1. CONTRACTOR IS RESPONSIBLE TO LOCATE AND DISCONNECT ALL EXISTING UTILITIES AT START OF CONSTRUCTION AND PRIOR TO RAISING THE BUILDING
2. FOUNDATION AND RECONNECT ALL BUILDING UTILITY SERVICES ONCE BUILDING HAS BEEN RAISED. REFER TO BUILDING PLANS FOR FURTHER INFORMATION.

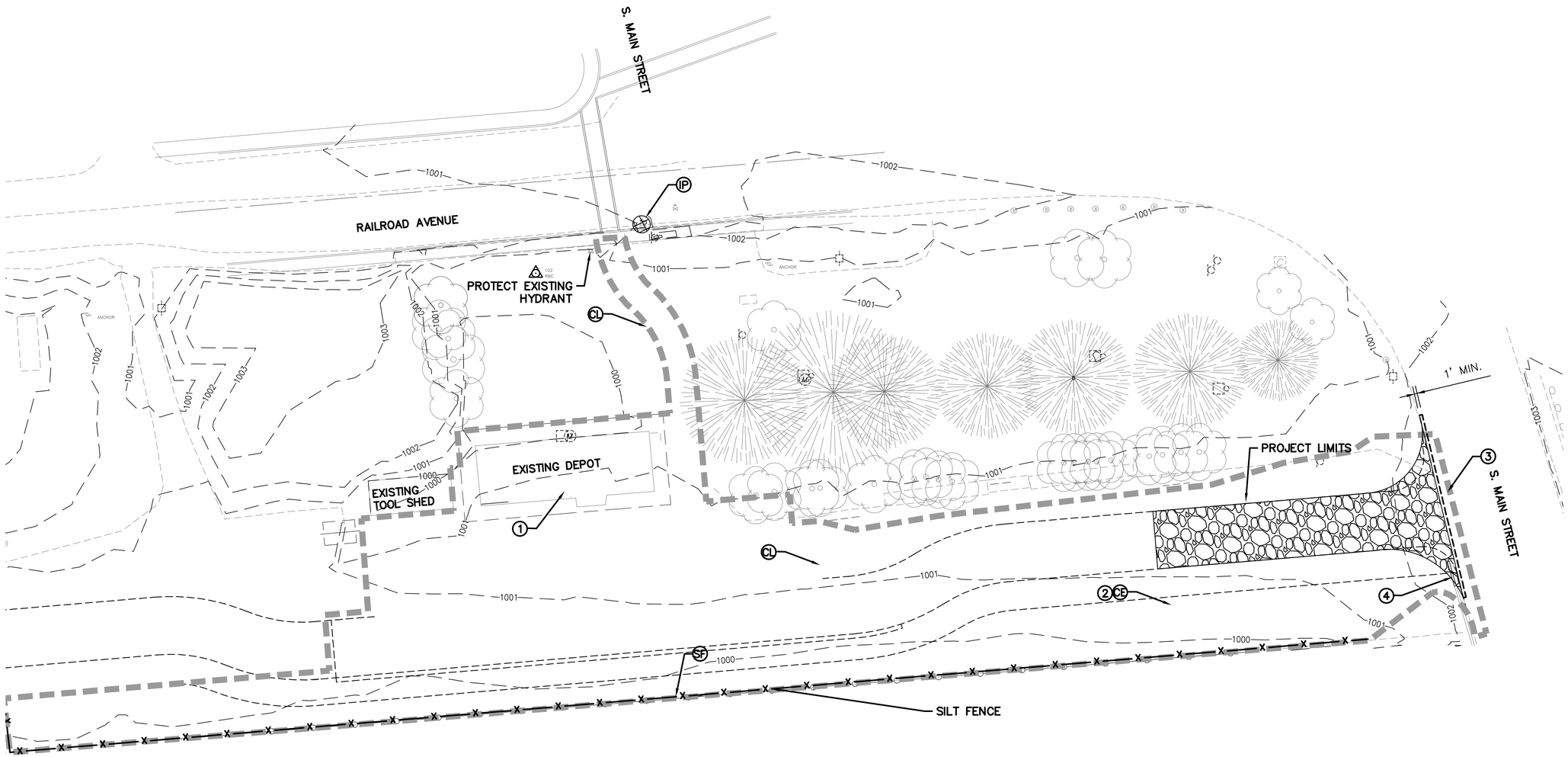
   USE EXISTING GRAVEL SURFACE AS TEMPORARY CONSTRUCTION ENTRANCE. IF DUST IS TRACKED OFFSITE, STREET SWEEPING WILL BE REQUIRED.
3. CONTRACTOR TO ENSURE NEAT SAWCUT LINE, REMOVE PAVEMENT, AND HOT TAR SEAL JOINT.
4. REMOVE EXISTING CURB AND GUTTER FOR INSTALLATION OF NEW DRIVEWAY APPROACH.

UTILITY LOCATE NOTES

1. THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES HAVE NOT BEEN VERIFIED BY THE OWNER OR ITS REPRESENTATIVE. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK AND AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES THAT HAPPEN DUE TO THE CONTRACTOR'S FAILURE TO LOCATE EXACTLY AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.
2. IN ADDITION TO THE 811 UTILITY LOCATE SERVICE THE CONTRACTOR SHALL OBTAIN INDEPENDENT PRIVATE LOCATES FOR ALL UNDERGROUND UTILITIES INCLUDING ANY PRIVATE BURIED COMMUNICATIONS/DATA, ETC.

N

20'
0 40'



1 TESC PLAN

SHEET 2 OF 8

CAD NO.

NO.	REVISIONS	INT.	APP.	DATE

ACTION	BY	DATE
DESIGNED	CF	
DRAWN	TS	
CHECKED (FIELD)	SK	
CHECKED (HDQTS.)		

SCOTT T. KAUL
STATE OF WASHINGTON
46972
REGISTERED
PROFESSIONAL ENGINEER

NOTICE:
ALTERATION OF THIS DOCUMENT SHALL INVALIDATE THE PROFESSIONAL SEAL AND SIGNATURE. PUBLICATION OF THIS DOCUMENT DOES NOT DEROGATE FROM RESERVED OWNERSHIP RIGHTS IN IT. THIS DOCUMENT IS FOR USE ONLY FOR THE PROJECT IDENTIFIED IN THE TITLE BLOCK AND IS NOT TO BE USED FOR REPAIR, REMODEL OR ADDITION TO THAT PROJECT OR FOR ANY OTHER PROJECT.

REGISTERED STAMP

WASHINGTON STATE PARKS AND RECREATION COMMISSION

KITTITAS DEPOT HISTORIC PRESERVATION

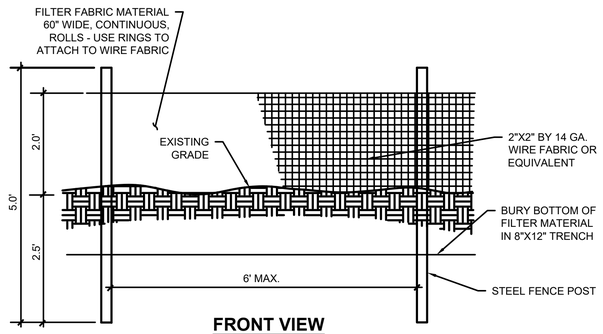
TEMPORARY EROSION AND SEDIMENT CONTROL (TESC)

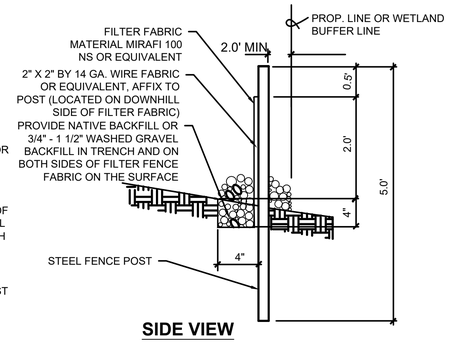
C-201

SCALE
AS SHOWN

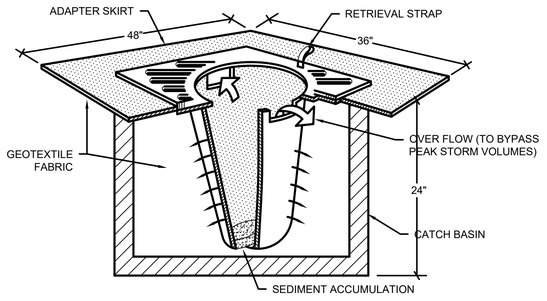
PARKS FILE# I500-6619-2024

DATE: August 1, 2024 FILENAME: Q:\2023\2230784\10_CIV\CAD\2230784-TESC.dwg

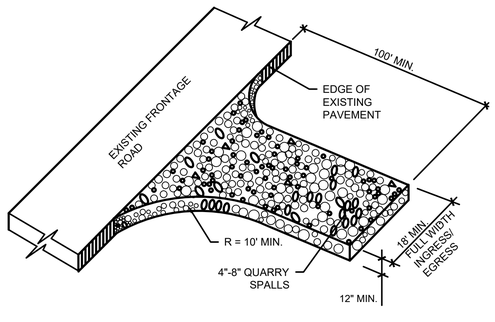




1 SILT FENCE



2 INLET PROTECTION



RE-USE OF EXISTING GRAVEL DRIVEWAY MAY BE ALLOWED BUT CONTRACTOR IS RESPONSIBLE TO UPGRADE TO QUARRY SPALLS IF SEDIMENT TRACKING OCCURS OFFSITE.

3 CONSTRUCTION ENTRANCE

SILT FENCE NOTES:

1. SILT FENCE SHALL BE PURCHASED IN A CONTINUOUS ROLL AND CUT TO THE LENGTH OF THE BARRIER TO AVOID USE OF JOINTS. WHEN JOINTS ARE NECESSARY, FILTER CLOTH SHALL BE SPLICED TOGETHER ONLY AT A SUPPORT POST, WITH A MINIMUM 6-INCH OVERLAP, AND SECURELY FASTENED AT BOTH ENDS TO POST.
2. POSTS SHALL BE SPACED A MAXIMUM OF 6 FEET APART AND DRIVEN SECURELY INTO THE GROUND (MINIMUM OF 30 INCHES).
3. A TRENCH SHALL BE EXCAVATED APPROXIMATELY 8 INCHES WIDE AND 12 INCHES DEEP ALONG THE LINE OF POSTS AND UPSLOPE FROM THE BARRIER. THIS TRENCH SHALL BE BACKFILLED WITH WASHED GRAVEL.
4. WHEN STANDARD STRENGTH FILTER FABRIC IS USED, A WIRE MESH SUPPORT FENCE SHALL BE FASTENED SECURELY TO THE UPSLOPE SIDE OF THE POSTS USING HEAVY-DUTY WIRE STAPLES AT LEAST 1 INCH LONG, TIE WIRES OR HOG RINGS. THE WIRE SHALL EXTEND INTO THE TRENCH A MINIMUM OF 4 INCHES AND SHALL NOT EXTEND MORE THAN 24 INCHES ABOVE THE ORIGINAL GROUND SURFACE.
5. THE STANDARD STRENGTH FILTER FABRIC SHALL BE STAPLED OR WIRED TO FENCE, AND 20 INCHES OF THE FABRIC SHALL BE EXTENDED INTO THE TRENCH. THE FABRIC SHALL NOT EXTEND MORE THAN 24 INCHES ABOVE THE ORIGINAL GROUND SURFACE. FILTER FABRIC SHALL NOT BE STAPLED TO EXISTING TREES.
6. SILT FENCES SHALL NOT BE REMOVED BEFORE THE UPSLOPE AREA HAS BEEN PERMANENTLY STABILIZED.
7. SILT FENCES SHALL BE INSPECTED IMMEDIATELY AFTER EACH RAINFALL AND AT LEAST DAILY DURING PROLONGED RAINFALL. ANY REQUIRED REPAIRS SHALL BE MADE IMMEDIATELY.
8. SILT FENCES WILL BE INSTALLED PARALLEL TO SLOPE CONTOURS.
9. CONTRIBUTING LENGTH TO FENCE WILL NOT BE GREATER THAN 100 FEET.
10. DO NOT INSTALL BELOW AN OUTLET PIPE OR WEIR.
11. INSTALL DOWNSLOPE OF EXPOSED AREAS.
12. DO NOT DRIVE OVER OR FILL OVER SILT FENCES.

HYDROSEEDING NOTES:

1. HYDROSEEDING SHALL BE APPLIED IN ACCORDANCE WITH THE ESC STANDARD PLAN NOTES ON THIS SHEET.
2. HYDROSEEDING TO BE THE FOLLOWING MIXTURE:

COMMON NAME	SEEDING RATES (LBS/AC)		
	A	B	C
WINTER OR SPRING WHEAT (I)	80		
SPRING BARLEY (I)		80	
REGREEN* OR TRITICALE			50
ANNUAL RYEGRASS (I)			
*STERILE WHEAT x WHEATGRASS HYBRID (N) = NATIVE PLANT SPECIES (I) = INTRODUCED, NON-NATIVE PLANT SPECIES			

3. 500 LBS/ACRE 10-20-20 FERTILIZER, 1500 LBS/ACRE WOOD FIBER CELLULOSE WITH 3 SOIL BINDER OR TACKING AGENT TO BE APPLIED WITH SEED MIXTURE.
4. SEED BEDS PLANTED BETWEEN MAY 1 AND AUGUST 31 WILL REQUIRE IRRIGATION AND OTHER MAINTENANCE AS NECESSARY TO FOSTER AND PROTECT THE ROOT STRUCTURE.
5. FOR SEED BEDS PLANTED BETWEEN OCTOBER 31 AND APRIL 30, ARMORING OF THE SEED BED WILL BE NECESSARY. (E.G., GEOTEXTILES, JUTE MAT, CLEAR PLASTIC COVERING.)
6. BEFORE SEEDING, INSTALL NEEDED SURFACE RUNOFF CONTROL MEASURES SUCH AS GRADIENT TERRACES, INTERCEPTOR DIKES, SWALES, LEVEL SPREADERS AND SEDIMENT BASINS.
7. THE SEEDBED SHALL BE FIRM WITH A FAIRLY FINE SURFACE, FOLLOWING SURFACE ROUGHENING. PERFORM ALL OPERATIONS ACROSS OR AT RIGHT ANGLES TO THE SLOPE.
8. FERTILIZERS ARE TO BE USED ACCORDING TO SUPPLIERS RECOMMENDATIONS. AMOUNTS USED SHOULD BE MINIMIZED, ESPECIALLY ADJACENT TO WATER BODIES AND WETLANDS.
9. SEED SHALL NOT BE USED IN AREAS SUBJECT TO WEAR BY CONSTRUCTION TRAFFIC.

CONSTRUCTION ENTRANCE NOTES:

1. MATERIAL SHALL BE 4 INCH TO 8 INCH QUARRY SPALLS AND MAY BE TOP-DRESSED WITH 1 INCH TO 3 INCH ROCK. (WSDOT STANDARD SPECIFICATIONS, SECTION 8-15.)
2. THE ROCK PAD SHALL BE AT LEAST 12 INCHES THICK AND 50 FEET LONG. WIDTH SHALL BE THE FULL WIDTH OF THE VEHICLE INGRESS AND EGRESS AREA.
3. ADDITIONAL ROCK SHALL BE ADDED PERIODICALLY TO MAINTAIN PROPER FUNCTION OF THE PAD.
4. PAVED ROADS SHALL BE KEPT FREE OF SEDIMENT TRACKED FROM THE PROJECT SITE. SEDIMENT TRACKED ONTO ADJACENT PAVED SURFACES SHALL BE REMOVED DAILY BY SWEEPING, WASHING TO SEDIMENT FROM ROAD SURFACE WILL NOT BE ALLOWED.
5. A TRUCK WHEEL WASH MAY BE REQUIRED TO BE INSTALLED AT ANY TIME UPON COUNTY'S REQUEST.
6. CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING DUST CONTROL PER COUNTY REQUIREMENTS.

NOTES:

1. THE CONSTRUCTION SEQUENCE ON SHEET C-201 SHALL BE FOLLOWED IN ORDER TO BEST MINIMIZE THE POTENTIAL FOR EROSION AND SEDIMENTATION CONTROL PROBLEMS.
2. INSPECT ALL ROADWAYS, AT THE END OF EACH DAY, ADJACENT TO THE CONSTRUCTION ACCESS ROUTE. IF IT IS EVIDENT THAT SEDIMENT HAS BEEN TRACKED OFF SITE AND/OR BEYOND THE ROADWAY APPROACH, CLEANING IS REQUIRED.
3. IF SEDIMENT REMOVAL IS NECESSARY PRIOR TO STREET WASHING, IT SHALL BE REMOVED BY SHOVELING OR PICKUP SWEEPING AND TRANSPORTED TO A CONTROLLED SEDIMENT DISPOSAL AREA.
4. IF STREET WASHING IS REQUIRED TO CLEAN SEDIMENT TRACKED OFF SITE, ONCE SEDIMENT HAS BEEN REMOVED, STREET WASH WASTEWATER SHALL BE CONTROLLED BY PUMPING BACK ON-SITE OR OTHERWISE PREVENTED FROM DISCHARGING INTO SYSTEMS TRIBUTARY TO WATERS OF THE STATE.
5. RESTORE CONSTRUCTION ACCESS ROUTE EQUAL TO OR BETTER THAN THE PRE-CONSTRUCTION CONDITION.
6. RETAIN THE DUFF LAYER, NATIVE TOPSOIL, AND NATURAL VEGETATION IN AN UNDISTURBED STATE TO THE MAXIMUM EXTENT PRACTICAL.
7. INSPECT SEDIMENT CONTROL BMPS WEEKLY AT A MINIMUM, DAILY DURING A STORM EVENT, AND AFTER ANY DISCHARGE FROM THE SITE (STORMWATER OR NON-STORMWATER). THE INSPECTION FREQUENCY MAY BE REDUCED TO ONCE A MONTH IF THE SITE IS STABILIZED AND INACTIVE.
8. CONTROL FUGITIVE DUST FROM CONSTRUCTION ACTIVITY IN ACCORDANCE WITH THE STATE AND/OR LOCAL AIR QUALITY CONTROL AUTHORITIES WITH JURISDICTION OVER THE PROJECT AREA.
9. STABILIZE EXPOSED UNWORKED SOILS (INCLUDING STOCKPILES), WHETHER AT FINAL GRADE OR NOT, WITHIN 10 DAYS DURING THE REGIONAL DRY SEASON (JULY 1 THROUGH SEPTEMBER 30) AND WITHIN 5 DAYS DURING THE REGIONAL WET SEASON (OCTOBER 1 THROUGH JUNE 30). SOILS MUST BE STABILIZED AT THE END OF A SHIFT BEFORE A HOLIDAY WEEKEND IF NEEDED BASED ON THE WEATHER FORECAST. THIS TIME LIMIT MAY ONLY BE ADJUSTED BY A LOCAL JURISDICTION WITH A "QUALIFIED LOCAL PROGRAM," IF IT CAN BE DEMONSTRATED THAT THE RECENT PRECIPITATION JUSTIFIES A DIFFERENT STANDARD AND MEETS THE REQUIREMENTS SET FOURTH IN THE CONSTRUCTION STORMWATER GENERAL PERMIT.
10. PROTECT INLETS, DRYWELLS, CATCH BASINS AND OTHER STORMWATER MANAGEMENT FACILITIES FROM SEDIMENT, WHETHER OR NOT FACILITIES ARE OPERABLE.
11. KEEP ROADS ADJACENT TO INLETS CLEAN.
12. INSPECT INLETS WEEKLY AT A MINIMUM AND DAILY DURING STORM EVENTS.
13. CONSTRUCT STORMWATER CONTROL FACILITIES (DETENTION/RETENTION STORAGE POND OR SWALES) BEFORE GRADING BEGINS. THESE FACILITIES SHALL BE OPERATIONAL BEFORE THE CONSTRUCTION OF IMPERVIOUS SITE IMPROVEMENTS.
14. STOCKPILE MATERIALS (SUCH AS TOPSOIL) ON SITE, KEEPING OFF OF ROADWAY AND SIDEWALKS.
15. COVER, CONTAIN AND PROTECT ALL CHEMICALS, LIQUID PRODUCTS, PETROLEUM PRODUCT, AND NONINERT WASTES PRESENT ON SITE FROM VANDALISM (SEE CHAPTER 173-304 WAC FOR THE DEFINITION OF INERT WASTE), USE SECONDARY CONTAINMENT FOR ON-SITE FUELING TANKS.
16. CONDUCT MAINTENANCE AND REPAIR OF HEAVY EQUIPMENT AND VEHICLES INVOLVING OIL CHANGES, HYDRAULIC SYSTEM REPAIRS, SOLVENT AND DE-GREASING OPERATIONS, FUEL TANK DRAIN DOWN AND REMOVAL, AND OTHER ACTIVITIES THAT MAY RESULT IN DISCHARGE OR SPILLAGE OF POLLUTANTS TO THE GROUND OR INTO STORMWATER RUNOFF USING SPILL PREVENTION MEASURES, SUCH AS DRIP PANS. CLEAN ALL CONTAMINATED SURFACES IMMEDIATELY FOLLOWING ANY DISCHARGE OR SPILL INCIDENT. IF RAINING OVER EQUIPMENT OR VEHICLE, PERFORM EMERGENCY REPAIRS ON SITE USING TEMPORARY PLASTIC BENEATH THE VEHICLE.
17. CONDUCT APPLICATION OF AGRICULTURAL CHEMICALS, INCLUDING FERTILIZERS AND PESTICIDES, IN SUCH A MANNER, AND AT APPLICATION RATES, THAT INHIBITS THE LOSS OF CHEMICALS INTO STORMWATER RUNOFF FACILITIES. AMEND MANUFACTURER'S RECOMMENDED APPLICATION RATES AND PROCEDURES TO MEET THIS REQUIREMENT, IF NECESSARY.
18. INSPECT ON A REGULAR BASIS (AT A MINIMUM WEEKLY, AND DAILY DURING/AFTER A RUNOFF PRODUCING STORM EVENT) AND MAINTAIN ALL EROSION AND SEDIMENT CONTROL BMPS TO ENSURE SUCCESSFUL PERFORMANCE OF THE BMPS. NOTE THAT INLET PROTECTION DEVICES SHALL BE CLEANED OR REMOVED AND REPLACE BEFORE SIX INCHES OF SEDIMENT CAN ACCUMULATE.
19. REMOVE TEMPORARY ESC BMPS WITHIN 30 DAYS AFTER THE TEMPORARY BMPS ARE NO LONGER NEEDED. PERMANENTLY STABILIZE AREAS THAT ARE DISTURBED DURING THE REMOVAL PROCESS.

SHEET 3 OF 8

CAD NO.

NO.	REVISIONS	INT.	APP.	DATE

ACTION	BY	DATE
DESIGNED	CF	
DRAWN	TS	
CHECKED (FIELD)	SK	
CHECKED (HDQTS.)		

SCOTT T. KAUL
STATE OF WASHINGTON
46972
REGISTERED
PROFESSIONAL ENGINEER

REGISTERED STAMP

WASHINGTON STATE PARKS AND RECREATION COMMISSION

KITTITAS DEPOT HISTORIC PRESERVATION

TESC NOTES AND DETAILS

C-202

SCALE
AS SHOWN

PARKS FILE# I500-6619-2024

PALOUSE TO CASCADES STATE PARK TRAIL
KITTITAS DEPOT HISTORIC PRESERVATION

The following list of major items of construction has been included for Bidder's convenience in preparing a bid proposal. Exclusion of items from this summary does not indicate exclusion from project. For lump sum items, the bidder is cautioned that the drawings are the only source for measurement of project quantities, and drawings have been detailed for this purpose. In preparing a bid proposal, Bidder should note apparent discrepancies between the list below and the drawings and consult with Engineer for verification.

BASE BID ITEMS

BID ITEM	DESCRIPTION	ESTIMATED QUANTITY	PAYMENT
1.	**TRENCH EXCAVATION SAFETY PROVISIONS**	**L.S.**	**PER LUMP SUM**
	See instructions on Bid Proposal Form.		
2.	**KITTITAS DEPOT HISTORIC PRESERVATION**	**L.S.**	**PER LUMP SUM**
	Includes all work associated with providing building and site improvements. All quantities shall be taken from the plans and site observations. Major items of work include: A. Select Demolition: Remove roofing, windows, doors and frames and portions of the interior walls, chimney, and selected plumbing fixtures. B. Building Improvements: Provide new roofing, rehabilitate or replace existing windows and doors, provide new mechanical, electrical, and plumbing systems, install new restrooms, refinish interior surfaces, paint the interior and exterior, and provide site improvements shown on the project drawings.		

END OF SECTION

PALOUSE TO CASCADES STATE PARK TRAIL
KITTITAS DEPOT HISTORIC PRESERVATION

BIDS DUE:
1:00PM, TUESDAY,
JANUARY 14, 2025

BID DELIVERY LOCATION:

DELIVER BIDS ELECTRONICALLY TO BIDBOX@PARKS.WA.GOV

Subject line to read: "EW-C6619 [YOUR COMPANY NAME]."

***** Bid Proposal and Signature: See Sections 7.1 and 11.1 of the Instructions to Bidders for expanded instructions for bid submittal. *****

BIDS SUBMITTED IN COMPLIANCE WITH THE CONTRACT DOCUMENTS

**** PLEASE PRINT CLEARLY BELOW ****

TOTAL BASE BID

(NOT INCLUDING SALES TAX)

⇩ PRICE WRITTEN-OUT COMPLETELY IN WORDS ⇩	⇩ PRICE IN NUMBERS ONLY ⇩
_____ (U.S.) DOLLARS	$_____

Printed Name of Person Signing Bid Proposal ⇧	Firm Name (Printed legibly) ⇧
Title ⇧ (Estimator, Vice-President, Owner, Principal, etc.)	Physical Street Address ⇧ **(NO PO Boxes Here)**
Contractor Registration No. & Expiration Date ⇧	City ⇧ State Zip + PLUS 4
Taxpayer Identification Number ⇧	( ) Area Code Phone Number ⇧
Washington UBI Number ⇧	( ) Area Code Fax Number ⇧
Employment Security Department Number ⇧	Area Code Cellular Phone Number ⇧
PO Box for US Mail Delivery (if any) ⇧	E-Mail Address (Enter N/A if none) ⇧

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

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

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

BASE BID ITEMS

BE SURE TO INCLUDE UNIT PRICES IF THE BOX IS NOT SHADED

ITEM NO.	DESCRIPTION	EST QTY	UNIT PRICE	TOTAL AMOUNT
1.	Trench Excavation Safety Provisions	LS.		
2.	Kittitas Depot Historic Preservation	LS.		
ITEM TOTAL MUST AGREE WITH PAGE 1 BID AMOUNT ➔				$

Minority and Women's Business Enterprises (MWBE), WA Small Business, WA Veteran-Owned Business Utilization Certification: The bidder certifies good faith efforts to provide opportunities to MWBEs, Small Businesses, and Veteran-Owned Businesses. If awarded, the bidder commits to utilizing these firms or approved substitutes on the project. If no such firms will be used, enter "N.A." on the first line.

Firm Name, Address and Federal I.D. #	Type of Work	Certificate Number	MBE%	WBE%	Small Business%	Veteran Business%
1						
2						
TOTALS						

Bidder may attach a separate sheet for additional MWBE Utilization Certification.

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

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

Bidder agrees to complete project (including accepted alternates) in accordance with drawings and specifications by **June 30, 2025**.

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

Apprentice Utilization Requirements. The apprentice labor hours required for this project are 15% of the total labor hours. The undersigned agrees to utilize this level of apprentice participation. A monetary incentive of $1,000 will be paid to the contractor meeting the apprentice utilization requirement. A monetary penalty will be applied to the contractor failing to meet the utilization requirement and failing to demonstrate a Good Faith Effort. The penalty will be $100 per percentage point not utilized.

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

Addenda: Receipt of addenda numbered [___] through [___] is hereby acknowledged.

_____

Signature of Authorized Official

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

PALOUSE TO CASCADES STATE PARK TRAIL
KITTITAS DEPOT HISTORIC PRESERVATION

SUBCONTRACTORS UTILIZATION LIST
(If Applicable)

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

SUBCONTRACTOR LISTING – RCW 39.30.060

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

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

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

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

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

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

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

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

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

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

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

Bidder may attach a separate sheet for additional alternate bid subcontractors

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

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

Bidder may attach a separate sheet for additional alternate bid subcontractors

Signature of Authorized Official

GENERAL CONDITIONS FOR CONSTRUCTION AT WASHINGTON STATE PARKS

PART 1 - GENERAL PROVISIONS

1.01 DEFINITIONS

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

1.02 ORDER OF PRECEDENCE

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

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

1.03 EXECUTION AND INTENT

Contractor makes the following representations to Owner:

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

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

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

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

PART 2 - INSURANCE AND BONDS

2.01 CONTRACTOR'S LIABILITY INSURANCE

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

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

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

        a. Completed operations/products liability;

        b. Explosion, collapse, and underground; and

        c. Employer's liability coverage.

    2. Automobile liability

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

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

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

2.02 COVERAGE LIMITS INSURANCE COVERAGE CERTIFICATES

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

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

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

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

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

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

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

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

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

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

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

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

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

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

2.03 INSURANCE COVERAGE CERTIFICATES

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

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

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

2.04 PAYMENT AND PERFORMANCE BONDS

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

2.05 ALTERNATIVE SURETY

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

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

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

2.06 BUILDER'S RISK

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

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

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

PART 3 - TIME AND SCHEDULE

3.01 PROGRESS AND COMPLETION

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

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

3.02 CONSTRUCTION SCHEDULE

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

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

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

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

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

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

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

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

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

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

3.03 OWNER'S RIGHT TO SUSPEND THE WORK FOR CONVENIENCE

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

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

1. Cancel the written notice suspending the Work; or

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

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

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

3.04 OWNER'S RIGHT TO STOP THE WORK FOR CAUSE

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

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

3.05 DELAY

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

1. Acts of God or the public enemy;

2. Acts or omissions of any government entity;

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

4. Quarantine or epidemic;

5. Strike or defensive lockout;

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

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

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

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

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

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

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

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

3.06 NOTICE TO OWNER OF LABOR DISPUTES

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

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

3.07 DAMAGES FOR FAILURE TO ACHIEVE TIMELY COMPLETION

A. Liquidated Damages

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

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

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

B. Actual Damages

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

PART 4 - SPECIFICATIONS, DRAWINGS, AND OTHER DOCUMENTS

4.01 DISCREPANCIES AND CONTRACT DOCUMENT REVIEW

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

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

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

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

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

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

4.02 PROJECT RECORD

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

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

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

4.03 SUBMITTALS

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

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

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

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

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

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

4.04 ORGANIZATION OF SPECIFICATIONS

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

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

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

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

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

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

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

PART 5 - PERFORMANCE

5.01 CONTRACTOR CONTROL AND SUPERVISION

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

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

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

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

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

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

5.02 PERMITS, FEES, AND NOTICES

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

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

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

5.03 PATENTS AND ROYALTIES

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

5.04 PREVAILING WAGES

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

5.05 HOURS OF LABOR

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

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

5.06 NONDISCRIMINATION

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

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

B. During performance of the Work:

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

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

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

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

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

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

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

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

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

5.07 SAFETY PRECAUTIONS

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

5.08 OPERATIONS, MATERIAL HANDLING, AND STORAGE AREAS

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

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

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

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

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

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

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

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

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

5.09 PRIOR NOTICE OF EXCAVATION

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

5.10 UNFORESEEN PHYSICAL CONDITIONS

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

5.12 LAYOUT OF WORK

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

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

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

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

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

5.13 MATERIAL AND EQUIPMENT

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

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

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

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

5.14 AVAILABILITY AND USE OF UTILITY SERVICES

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

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

5.15 TESTS AND INSPECTION

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

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

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

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

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

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

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

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

5.16 CORRECTION OF NONCONFORMING WORK

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

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

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

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

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

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

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

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

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

5.17 CLEAN UP

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

5.18 ACCESS TO WORK

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

5.19 OTHER CONTRACTS

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

5.20 SUBCONTRACTORS AND SUPPLIERS

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

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

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

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

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

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

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

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

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

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

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

5.21 WARRANTY OF CONSTRUCTION

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

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

1. Obtain all warranties that would be given in normal commercial practice;

2. Require all warranties to be executed, in writing, for the benefit of Owner;

3. Enforce all warranties for the benefit of Owner, if directed by Owner; and

4. Be responsible to enforce any subcontractor's, manufacturer's, or supplier's warranty should they extend beyond the period specified in the Contract Documents.

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

5.22 INDEMNIFICATION

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

1. The sole negligence of Contractor or any of its Subcontractors;

2. The concurrent negligence of Contractor, or any Subcontractor, but only to the extent of the negligence of Contractor or such Subcontractor; and

3. The use of any design, process, or equipment which constitutes an infringement of any United States patent presently issued, or violates any other proprietary interest, including copyright, trademark, and trade secret.

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

PART 6 - PAYMENTS AND COMPLETION

6.01 CONTRACT SUM

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

6.02 SCHEDULE OF VALUES

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

6.03 APPLICATION FOR PAYMENT

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

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

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

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

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

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

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

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

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

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

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

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

6.04 PROGRESS PAYMENTS

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

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

C. Title to all Work and materials covered by a progress payment shall pass to Owner at the time of such payment free and clear of all liens, claims, security interests, and encumbrances. Passage of title shall not, however, relieve Contractor from any of its duties and responsibilities for the Work or materials, or waive any rights of Owner to insist on full compliance by Contractor with the Contract Documents.

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

6.05 PAYMENTS WITHHELD

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

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

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

6.06 RETAINAGE AND BOND CLAIM RIGHTS

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

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

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

6.07 SUBSTANTIAL COMPLETION

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

6.08 PRIOR OCCUPANCY

A. Owner may, upon written notice thereof to Contractor, take possession of or use any completed or partially completed portion of the Work ("Prior Occupancy") at any time prior to Substantial Completion. Unless otherwise agreed in writing, Prior Occupancy shall not: be deemed an acceptance of any portion of the Work; accelerate the time for any payment to Contractor; prejudice any rights of Owner provided by any insurance, bond, guaranty, or the Contract Documents; relieve Contractor of the risk of loss or any of the

obligations established by the Contract Documents; establish a date for termination or partial termination of the assessment of liquidated damages; or constitute a waiver of claims.

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

6.09 FINAL COMPLETION, ACCEPTANCE, AND PAYMENT

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

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

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

PART 7 - CHANGES

7.01 CHANGES IN THE WORK

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

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

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

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

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

F. Field Authorization

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

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

7.02 CHANGES IN THE CONTRACT SUM

A. General Application

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

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

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

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

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

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

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

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

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

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

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

B. Change Order Pricing -- Fixed Price

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

C. Change Order Pricing -- Unit Prices

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

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

2. Contractor shall:

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

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

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

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

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

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

2. Contractor shall:

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

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

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

7.03 CHANGES IN THE CONTRACT TIME

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

PART 8 - CLAIMS AND DISPUTE RESOLUTION

8.01 CLAIMS PROCEDURE

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

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

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

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

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

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

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

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

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

7. If an adjustment in the Contract Time is sought: the specific days and dates for which it is sought; the specific reasons Contractor believes an extension in the Contract Time should be granted; and

Contractor's analysis of its Progress Schedule to demonstrate the reason for the extension in Contract Time;

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

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

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

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

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

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

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

8.02 ARBITRATION

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

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

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

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

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

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

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

8.03 CLAIMS AUDITS

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

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

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

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

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

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

PART 9 - TERMINATION OF THE WORK

9.01 TERMINATION BY OWNER FOR CAUSE

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

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

B. Upon termination, Owner may at its option:

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

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

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

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

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

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

9.02 TERMINATION BY OWNER FOR CONVENIENCE

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

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

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

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

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

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

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

6. Continue performance only to the extent not terminated.

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

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

PART 10 - MISCELLANEOUS PROVISIONS

10.01 GOVERNING LAW

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

10.02 SUCCESSORS AND ASSIGNS

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

10.03 MEANING OF WORDS

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

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

10.04 RIGHTS AND REMEDIES

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

10.05 CONTRACTOR REGISTRATION

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

10.06 TIME COMPUTATIONS

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

10.07 RECORDS RETENTION

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

10.08 THIRD-PARTY AGREEMENTS

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

10.09 ANTITRUST ASSIGNMENT

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

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

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

A. When referred to in this Contract, the terms Minority Business Enterprise (MBE) and Women's Business Enterprise (WBE) will be as defined by OMWBE, WAC 326-02-030.

B. The OMWBE has compiled a directory of certified firms. Copies of this directory may be obtained through the OMWBE. For information regarding the certification process or the certification status of a particular firm, contact:

OMWBE, 406 South Water Street, PO Box 41160, Olympia, WA 98504-1160, telephone (360) 753-9693.

C. Eligible MWBEs or M/W firms

MWBE firms utilized for this project for voluntary MWBE goals may be certified by Washington State OMWBE or self identified as minority or women owned (M/W firm).

D. MWBE Voluntary Goals

The Owner has established voluntary goals for MWBE participation for this project. The voluntary goals are set forth in the Advertisement for Bids.

E. If any part of the contract, including the supply of materials and equipment, is anticipated to be subcontracted, then prior to receipt of the first payment, Contractor shall submit, pursuant to Section 5.20 A, a list of all subcontractors/suppliers it intends to use, designate whether any of the subcontractors/suppliers are MWBE firms, indicate the anticipated dollar value of each MWBE subcontract, and provide Tax Identification Number (TIN).

F. If any part of the contract, including the supply of materials and equipment is actually subcontracted during completion of the work, then prior to final acceptance or completion of the contract or as otherwise indicated in the contract documents, the Contractor shall submit a statement of participation indicating what MWBEs were used and the dollar value of their subcontracts.

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

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

I. Bidders should advertise opportunities for subcontractors or suppliers in a manner reasonably designed to provide MWBEs capable of performing the work with timely notice of such opportunities, and all advertisements shall include a provision encouraging participation by MWBE firms. Advertising may be done through general advertisements (e.g. newspapers, journals, etc.) or by soliciting bids directly from MWBEs. Bidders shall provide MWBEs that express interest with adequate and timely information about plans, specifications, and requirements of the contract.

J. Contractors shall not create barriers to open and fair opportunities for all businesses including MWBEs to participate in all State contracts and to obtain or compete for contracts and subcontracts as sources of supplies, equipment, construction and services.

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

10.11 MINIMUM LEVELS OF APPRENTICESHIP PARTICIPATION

In accordance with Executive Order 00-01 the State of Washington may require apprenticeship participation for projects of a certain cost. The bid advertisement and Bid Proposal form shall establish the minimum percentage of apprentice labor hours as compared to the total labor hours.

A. Voluntary workforce diversity goals have been established for the apprentice hours. These goals are that one-fifth (1/5) of the apprentice hours be performed by minorities, and one-sixth (1/6) of the apprentice hours be performed by women.

B. Apprentice participation, under this contract, may be counted towards the required percentage (%) only if the apprentices are from an apprenticeship program registered and approved by the Washington State Apprenticeship and Training Council (RCW 49.04 and WAC 296-04).

C. Bidders may contact the Department of Labor and Industries, Specialty Compliance Services Division, Apprenticeship Section, P.O. Box 44530, Olympia, WA 98504-4530 by phone at (360) 902-5320, and e-mail at thum235@lni.wa.gov, to obtain information on available apprenticeship programs.

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

1. Contractor name and address
2. Contract number
3. Project name
4. Contract value
5. Reporting period "Notice to Proceed" through "Invoicing Date"
6. Craft/trade/occupation of all (contractor and subcontractor trades working on the project) apprentices and journeymen
7. Total number of apprentices and total number of hours worked by apprentices, both categorized by gender and ethnicity
8. Total number of journeymen and total number of hours worked by journeymen, both categorized by gender and ethnicity
9. Cumulative combined total of apprentice and journeymen labor hours.
10. Total percentage of apprentice hours worked
11. No changes to the required percentage (%) of apprentice participation shall be allowed without written approval of the Owner. In any request for the change the Contractor shall clearly demonstrate a good faith effort to comply with the requirements for apprentice participation.
12. Any substantive violation of the mandatory requirements of this part of the contract may be a material breach of the contract by the Contractor. The Owner may withhold payment pursuant to Part 6.05, stop the work for cause pursuant to Part 3.04, and terminate the contract for cause pursuant to Part 9.01.

10.12 HEADINGS AND CAPTIONS

Headings for convenience only: All headings and captions used in these General Conditions are only for convenience of reference and shall not be used in any way in connection with the meaning, effect, interpretation, construction, or enforcement of the General Conditions, and do not define the limit or describe the scope or intent of any provision of these General Conditions.

10.13 SUBCONTRACTOR PAYMENTS REPORTING REQUIREMENTS

This Contract is subject to compliance tracking using the State's business diversity management system, Access Equity (B2Gnow). Access Equity is web-based and can be accessed at the Office of Minority and Women's Business Enterprises at https://omwbe.diversitycompliance.com/. The Contractor and all Subcontractors shall report and confirm receipt of payments made to the Contractor and each Subcontractor through Access Equity.

The Contractor may contact State Parks Contracts and Grants at contracts@parks.wa.gov for technical assistance in using the Access Equity system. User guides and documentation related to Contractor and Subcontractor access to and use of Access Equity are available online at https://omwbe.wa.gov/access-equity-help-center. The Public Owner reserves the right to withhold payments from the Contractor for non-compliance with this section. For purposes of this section, Subcontractor means any subcontractor working on the Contract, at any tier and regardless of status as certified WMBE or Non-WMBE.
The Contractor shall:

a. Register and enter all required Subcontractor information into Access Equity no later than 15 days after the Public Owner creates the Contract Record.

b. Complete the required user training (two (2) one-hour online sessions) no later than 20 days after the Public Owner creates the Contract Record.

c. Report the amount and date of all payments (i) received from the Public Owner, and (ii) paid to Subcontractors, no later than 30 days, issuance of each payment made by the Public Owner to the Contractor, unless otherwise specified in writing by the Public Owner, except that the Contractor shall mark as "Final" and report the final Subcontractor payments) into Access Equity no later than thirty (30) days after the final payment is due the Subcontractor(s) under the Contract, with all payment information entered no later than sixty (60) days after end of fiscal year.

d. Monitor contract payments and respond promptly to any requests or instructions from the Public Owner or system-generated messages to check or provide information in Access Equity.

e. Coordinate with Subcontractors, or Public Owner when necessary, to resolve promptly any discrepancies between reported and received payments.

f. Require each Subcontractor to: (i) register in Access Equity and complete the required user training; (ii) verify the amount and date of receipt of each payment from the Contractor or a higher tier Subcontractor, if applicable, through Access Equity; (iii) report payments made to any lower tier Subcontractors, if any, in the same manner as specified herein; (iv) respond promptly to any requests or instructions from the Contractor or system-generated messages to check or provide information in Access Equity; and (v) coordinate with Contractor, or Public Owner when necessary, to resolve promptly any discrepancies between reported and received payments.

END OF CONDITIONS

/ / / / /

Approved as to Form:
William Van Hook /s/
Asst. Attorney General
02/2007
08/2010 GA Updates – jrc
09/2010 to AAG Schwartz

PALOUSE TO CASCADES STATE PARK TRAIL
KITTITAS DEPOT HISTORIC PRESERVATION

SUPPLEMENTAL BIDDER RESPONSIBILITY CRITERIA
WITH INCLUSION PLAN AND APPRENTICESHIP REQUIREMENTS

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

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

1.1 REQUIRED INFORMATION/CRITERIA

A. For the purposes of the Supplemental Bidder Responsibility evaluation process, the scope of this project generally involves:

- *Rehabilitate the 1909 Kittitas Depot with structural upgrades, roof replacement, window and door repairs, and selective demolition.*
- *Install ADA-compliant restrooms, modern building systems, insulation, and complete site improvements including paving and concrete work.*

B. Experience Of Contractor On Projects Of Similar Size And Complexity: Contractor is required to have successfully completed at least **three (3)** projects of similar type, size and complexity to this project, each with a contract amount of at least **$500,000**, within the last **seven (7)** years.

C. List of Completed Projects (Use Form 1, Contractor Experience Detail): Provide a list of all the construction contracts **$500,000** and above your firm has completed within the past **three (3)** years, giving the name of the project; name, address, and phone numbers of Owner and architect representatives; final contract amount; date of completion; and percentage of the cost of the work performed with your firm's own forces. This information will be used for reference reviews.

2.1 EXPERIENCE OF KEY PERSONNEL

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

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

3.1 DIVERSE BUSINESS INCLUSION PLAN (USE FORM 3)

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

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

4.1 APPRENTICESHIP (USE FORMS 1 & 4)

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

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

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

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

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

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

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

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

END OF SECTION

PALOUSE TO CASCADES STATE PARK TRAIL
KITTITAS DEPOT HISTORIC PRESERVATION

Supplemental Bidder Responsibility
Form 1 - Contractor Experience Detail

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

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

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

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

PALOUSE TO CASCADES STATE PARK TRAIL
KITTITAS DEPOT HISTORIC PRESERVATION
Supplemental Bidder Responsibility
Form 2 - Resume of Key Personnel

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

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

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

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

PALOUSE TO CASCADES STATE PARK TRAIL
KITTITAS DEPOT HISTORIC PRESERVATION

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

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

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

PALOUSE TO CASCADES STATE PARK TRAIL
KITTITAS DEPOT HISTORIC PRESERVATION

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

Prime Contractor Name: _____

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

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

Anticipated Certified Diverse Business Participation Goals

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

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

Subcontracting Team

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

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

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

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

Diverse Expert:

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

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

PALOUSE TO CASCADES STATE PARK TRAIL
KITTITAS DEPOT HISTORIC PRESERVATION

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

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

Diverse Expert Name: ____

Diverse Expert Contact Information: ____

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

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

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

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

PALOUSE TO CASCADES STATE PARK TRAIL
KITTITAS DEPOT HISTORIC PRESERVATION

Supplemental Bidder Responsibility
Form 4 – Apprenticeship Utilization

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

Telephone:	Cell Phone:	Email Address:

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

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

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

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

PALOUSE TO CASCADES STATE PARK TRAIL
KITTITAS DEPOT HISTORIC PRESERVATION

Supplemental Bidder Responsibility
Form 5 - Reference Evaluation Questionnaire

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

☐ Prime
☐ Subcontractor

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

PERFORMANCE EVALUATION

Rating Criteria - Rate on a scale of 1 to 5

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

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

Evaluator Information

Name of Evaluator: Title:

Firm/Company Name:

Firm Address:

Phone: Email:

Form 6 – Supplemental Responsibility Criteria Evaluation Score Sheet

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

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

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

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

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

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

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

Comments _____

Determination ☐ Responsible
☐ Not Responsible (Preliminary Determination)

Evaluated by _____ Date _____
State Parks Project Representative

_____
Signature

PREVAILING WAGES

Instruction for Prevailing Wage Rates

The State of Washington prevailing wage rates for this public works project, which is located in Kittitas County, may be found at the following website address of the Department of Labor and Industries:

https://secure.lni.wa.gov/wagelookup/rates/journey-level-rates

The prevailing wages for this project are those that are in effect on the date that the bids are due.

Contractor to Pay Prevailing Wages

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

A copy of the applicable wage rates is available upon request. Please request a copy by email at: contracts@parks.wa.gov.

SECTION 010000 – GENERAL REQUIREMENTS

PART 1 - GENERAL

1.1 SPECIAL NOTICE

A. All work for this project must be completed by June 30, 2025 and billing received by the Washington State Parks and Recreation Commission by 5:00 P.M., July 12, 2025.

1.2 DESCRIPTION OF WORK

A. This project will rehabilitate the existing 1909 Kittitas Depot. The work includes foundation improvements, window and door repair and replacement, roof replacement, selective demolition, installation of two new ADA compliant restrooms, new mechanical, electrical, and plumbing systems within the building, insulation installation, painting, site improvements (including paving and concrete flatwork), and other items.

1.3 TIME FOR COMPLETION OF PROJECT

A. Substantially complete project in accordance with the drawings and specifications by June 30, 2025. Final completion in accordance with Contract Documents within 30 calendar days from substantial completion date.

1.4 HOURS OF WORK

A. Work hours are between 7:00 a.m. and & 7:00 p.m. Monday through Friday, excluding national holidays.

1.5 LIQUIDATED DAMAGES

A. If Contractor fails to complete Contract within stipulated time, an assessment of $500 per day will be made against Contractor for each additional day required to complete contract, unless an extension of time was granted through Change Order. This assessment is to cover Commission's liquidated damages and is not to be construed as a penalty.

B. Contract authorizes the Washington State Parks and Recreation Commission to deduct liquidated damages from money due at completion of contract.

1.6 PRE-CONSTRUCTION CONFERENCE

A. Following notification of award to Contractor, the date for an on-site pre-construction conference will be set. Do not commence Work prior to conference or until written clearance has been obtained from Project Representative.

B. Furnish Project Representative with following:

1. Complete list of sub-contractors, including business address, telephone numbers, items of Work, and registration numbers. List is to be updated during contract life.
2. Name and contact information of Contractor's staff who is in charge and responsible for site safety and will be on site at all times.
3. A Site-Specific Safety Plan that is in compliance with the Department of Labor and Industries and 000011 – General Conditions specifically for this project.
4. A progress schedule in accordance with General Conditions.
5. A detailed cost breakdown for lump sum bid items. Furnish a fair evaluation of actual cost of each items of Work listed. This will be used in processing Contractor's requests for partial payment. Submittal of breakdown does not affect the Contract terms.
6. Written document detailing plans to comply with 15 percent Apprenticeship Participation requirement stated in Instruction to Bidders 4.1B.

C. Project Representative will supply a list of hazardous products that could be encountered on Project. Appropriate Safety Data Sheet (SDS) will be on file at park.

1.7 PROGRESS CLEANING

A. Remove rubbish and debris from park property daily unless otherwise directed do not allow accumulation. Store materials that cannot be removed daily only in areas specified by the Project Representative.

B. Maintain worksites in a neat and orderly condition.

C. Cleanup operations are incidental to the Contract and no extra compensation will be made.

1.8 WASHINGTON STATE DEPARTMENT OF TRANSPORTATION (WSDOT)

A. **None** of WSDOT General Requirements, measurement or payment provisions apply.

1.9 AS-BUILT DRAWINGS

A. Keep a clean set of full-sized drawings at job site to use to identify changes.

1.10 PROJECT CONDITIONS

A. Hazardous Materials: Hazardous materials are present in construction affected by removal and dismantling work. A report on the presence of hazardous materials is on file for review and use. Examine report to become aware of locations where hazardous materials are present.

1. Hazardous material remediation is specified elsewhere in the Contract Documents.
2. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified elsewhere in the Contract Documents.

1.11 PROJECT SIGN

A. Provide following temporary sign. Sign location to be determined by Project Representative. Upon Project completion, remove sign and restore area to original condition.

1.12 PROJECT SIGN LETTERING

TITLE OF PROJECT:	KITTITAS DEPOT HISTORIC PRESERVATION
NAME OF FACILITY:	PALOUSE TO CASCADES STATE PARK TRAIL
NAME OF CONTRACTOR:	(Place Contractor's Name here)
ADDRESS OF CONTRACTOR:	(Place Contractor's Address here)
FUNDING TITLE NUMBER 1:	STATE BUILDING CONSTRUCTION ACCOUNT
FUNDING TITLE NUMBER 2:	LEAVE BLANK FOR THIS PROJECT

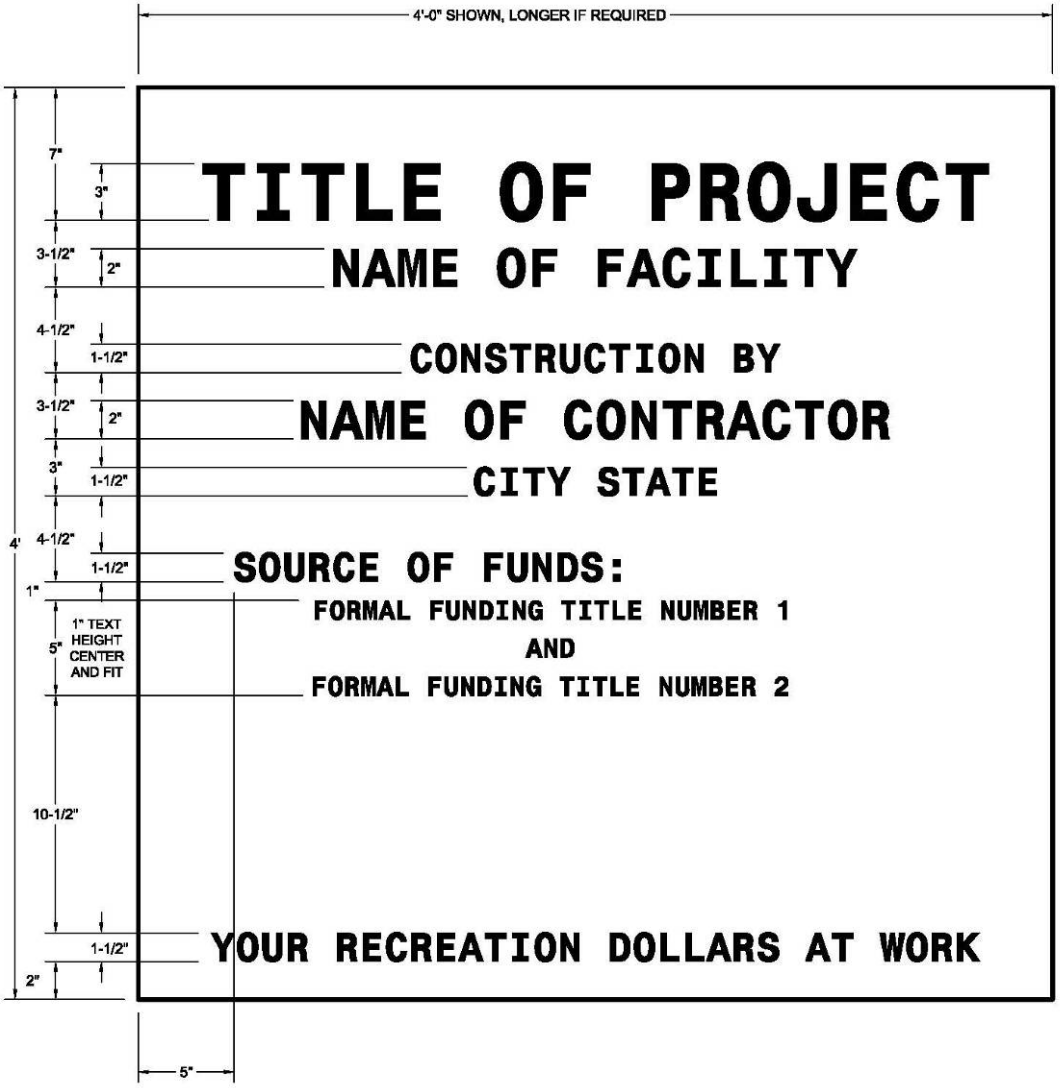
1.13 PARTNERSHIP IN THE CONTRACT

A. As partners in this contract, both Contractor and Commission recognize the value of a successful Project. Both parties recognize, besides the tangible benefits to Contractor and the Commission, the citizens of Washington State and visitors to Washington State Parks will benefit immensely from the successful completion of a quality Project.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

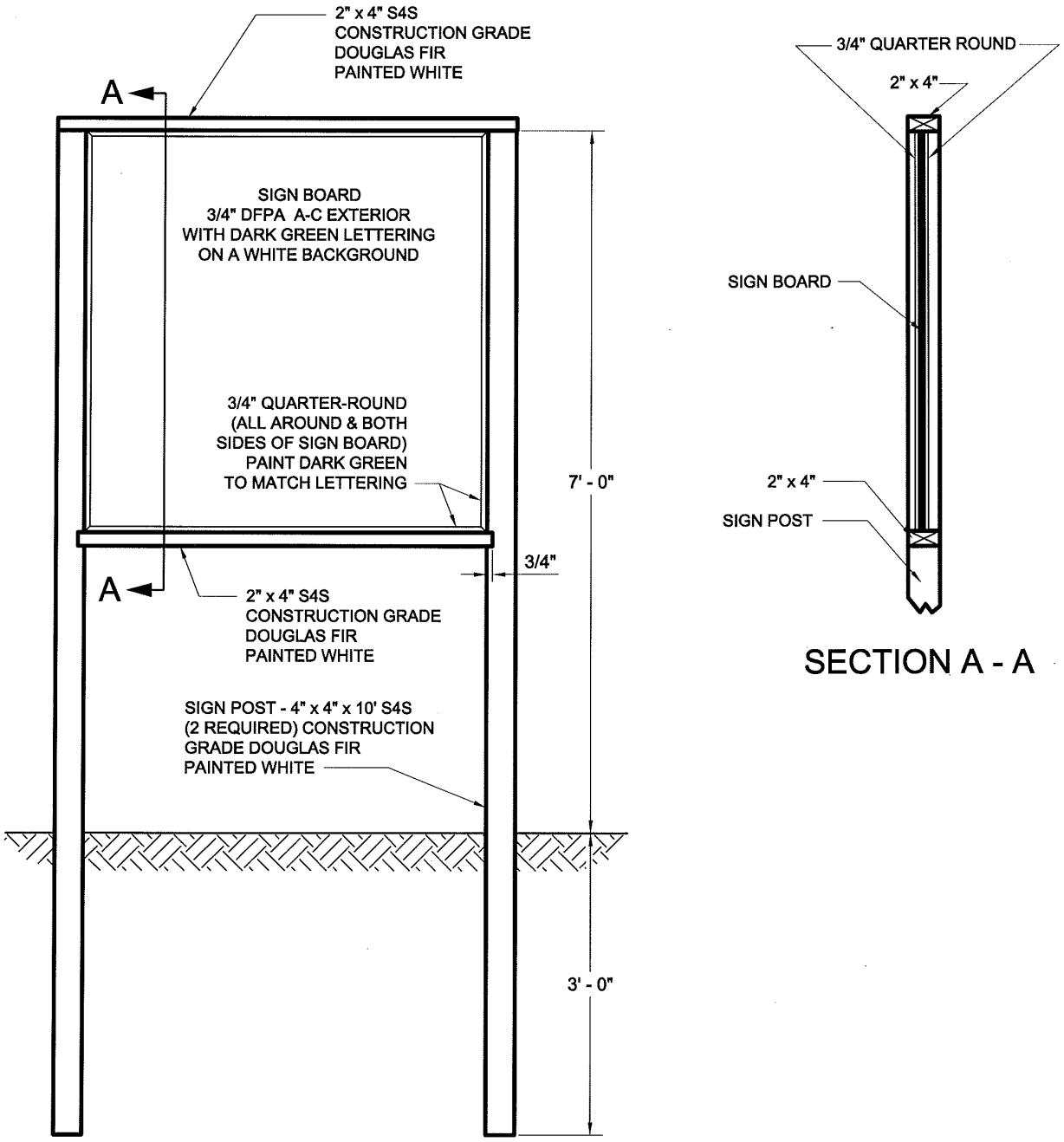
PROJECT SIGN DETAIL



LAY OUT SIGN TO FIT ON A PORTION OF ONE (1) SHEET OF PLYWOOD. IF PLYWOOD IS THE FINAL SURFACE, PAINT IT WITH TWO (2) OR MORE COATS OF WHITE PAINT TO FORM A SMOOTH, NONABSORBENT SURFACE. PROVIDE DARK GREEN WELL FORMED LETTERS, EVENLY SPACED, NEAT IN APPEARANCE, AND ALIGNED AS SHOWN ABOVE.

WASHINGTON STATE PARKS
PROJECT SIGN DETAIL

PROJECT SIGN DETAIL



PLAN

END OF SECTION

SECTION 013216 - CONSTRUCTION PROGRESS SCHEDULES

PART 1 - GENERAL

1.1 GENERAL

A. The intent of the progress schedule is to assist the Contractor in planning execution of the Work and to assist the Contractor and Project Representative in monitoring the construction progress for the purpose of coordination, communication, evaluation of Applications for Payment, and evaluation of time extension requests.

B. The Project Representative's review of the schedule will be to ensure that it conforms to the requirements of the Contract Documents. The construction means, methods, sequence, and scheduling of the Work is the Contractor's responsibility and is not reviewed by the Project Representative. Contract completion date(s) is as specified in the Contract Documents. The Project Representative's review of the schedule does not change, revise, or amend that date(s), nor does it constitute an approval of the Contractor's ability to complete the Work within the contract time.

1.2 SCHEDULES

A. Time-scaled CPM procedure network diagram separate activity bar for each activity. Show order and interdependence of activities and sequence of work. Show how start of an activity depends upon completion of preceding activities and how incompletion of the activity may delay start of subsequent activities. Show early and late start, early and late finish, float time, and duration. Indicate critical path.

B. Sheet size: Maximum 11 in. x 17 in.

C. Lettering 1/8 in. high minimum, legible.

D. Identify each item by specification section number.

E. Identify Work of separate stages and other logically grouped activities.

F. Provide sub-schedules for each stage of Work identified in Section 01 11 00.

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

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

I. Provide separate schedule of submittal dates for shop drawings, product data, and samples, including Owner furnished products, and dates reviewed submittals will be required from Architect. Indicate decision dates for selection of finishes.

J. Indicate product delivery datesfor major items.

K. Include submission and review of Operation and Maintenance Manuals, project record

documents, and warranties.

L. Include time for punchlist review and completion.

M. Include a minimum of two (2) weeks float time to account for changes in the work and unforeseen conditions.

1.3 **REVISIONS TO SCHEDULES**

A. Indicate progress of each activity to date of submittal, and projected completion date of each activity.

B. Identify activities modified since previous submittal, major changes in scope, and other identifiable changes.

C. Provide narrative report to define problem areas, anticipated delays, and impact on Schedule. Report corrective action taken, or proposed, and its effect including the effect of changes on schedules of separate contractors.

1.4 **SUBMITTALS**

A. Submit initial schedules at Preconstruction Conference in accordance with the General Conditions 01 00 00. After review, resubmit required revised data within ten (10) days.

B. Submit revised Progress Schedules with each Application for Payment.

C. Submit one (1) e- copy in PDF format.

1.5 **DISTRIBUTION**

A. Distribute copies of reviewed schedules to project site file, subcontractors, suppliers, and other concerned parties.

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

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION

SECTION 013300 – SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. For information on submittals see General Conditions 4.03

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION – (NOT USED)

END OF SECTION

SECTION 013501 – INADVERTENT DISCOVERIES OF CULTURAL RESOURCES AND HUMAN SKELETAL REMAINS

PART 1 - GENERAL

1.1 PROJECT SPECIFIC REQUIREMENTS

A. No cultural resource sites are known to exist within Work area. However, there always exist the potential for unanticipated discoveries during excavation work.

B. Special Conditions: During excavation construction crews may note a diffuse scatter of historic-period debris (e.g., window glass, nails, wood and ceramic fragments, coal, ash, and boiler slag, etc.) – these materials have been recorded as an archaeological resource that is not eligible for listing in the NRHP; this resource type does not need to be avoided during construction and the Inadvertent Discovery Plan (IDP) does not need to be implemented if these material types are encountered. If construction crews observe intact historic-period deposits, buried historic-period features, or any precontact archaeological deposits or features (see IDP below), crews should pause work and follow the steps outlined in the IDP. If there is any question regarding the application of the IDP, contact the lead Archaeologist on the project, Ayla Aymond.

1.2 EMERGENCY CONTACTS

WSPRC Archaeologists

Jennifer Wilson, Archaeology Program Manager	(360) 787-6511 (cell)
Email: jennifer.wilson@parks.wa.gov	(360) 902-8637 (office)
Shari Silverman, Archaeologist SW Region	(435) 260-9894 (cell)
Email: shari.silverman@parks.wa.gov	(360) 902- 8640 (office)
Kayley Bass, Archaeologist SW Region	(360) 701-1277 (cell)
Emails: kayley.bass@parks.wa.gov	
Sarah DuBois, Archaeologist Eastern Region	(360) 972-5884 (cell)
Email: sarah.dubois@parks.wa.gov	(509) 665-4336 (office)
Ayla Aymond, Archaeologist Eastern Region	(509) 743-8251 (cell)
Email: ayla.aymond@parks.wa.gov	
Sean Stcherbinine, Archaeologist NW Region	(360) 770-1419 (cell)
Email: sean.stcherbinine@parks.wa.gov	
Laura Syvertson, Archaeologist NW Region	(360) 770-0444 (cell)
Email: laura.syvertson@parks.wa.gov	
Maurice Major, Stewardship Archaeologist	(360) 701-6218 (cell)
Email: maurice.major@parks.wa.gov	(360) 902-8503 (office)

WSPRC Curator of Collections/NAGPRA Specialist

Alicia L. Woods, Statewide Curator of Collections & NAGPRA Specialist	(360) 586-0206 (office)

State Physical Anthropologist

Guy Tasa, PhD, Dept. of Archaeology and Historic Preservation	(360) 790-1633 (cell)

Assistant State Physical Anthropologist
Julie Berger, Dept. of Archaeology and Historic Preservation(360) 890-2633 (cell)

County Coroner/Examiner
Nick Henderson, Kittitas County Coroner (509)933-8200 (office) or (509)856-4970 (cell)

Area Manager
John Ernster, Central Cascades Area Manager, (509)968-5298 (office) or (509)899-9294 (cell)

Region Manager
Jason Both, Eastern Region Manager (509)665-4317 (office) or (509)860-8792 (cell)

Local Law Enforcement (if can't get ahold of any park staff)
City of Kittitas Police (509)925-8534

1.3 INADVERTENT DISCOVERIES OF CULTURAL RESOURCES AND HUMAN SKELETAL REMAINS

A. Many of Washington's most important heritage sites reside on lands owned or managed by the Washington State Parks and Recreation Commission (WSPRC). Nearly all Washington State Parks contain one or more important historic buildings, structures, or archaeological sites. For this reason, archaeological surveys and historic building inventories are ordinarily commissioned as a part of background analysis and information gathering for park developments and undertakings. Results of these surveys are used during project planning to ensure every effort is made to avoid impacts to cultural resources. Yet, despite these efforts, there **always** remains some potential for unanticipated discoveries while working in Washington State Parks.

B. All unanticipated discoveries, both cultural resources and human skeletal remains, are subject to all applicable federal and state statues, regulations, and executive orders. For these reasons, the Inadvertent Discovery Plan (IDP) provides useful guidance and instructions for circumstances when cultural resources or human skeletal remains are found. Please carefully read these instructions. If you have any questions, please contact the appropriate WSPRC Area Manager or the WSPRC archaeologist assigned to the undertaking. It is also strongly recommended that anyone conducting ground-disturbing activities watch the training video produced by Washington State Dept of Ecology: Inadvertent Discovery of Cultural Resources or Human Remains: Training for Field Staff. This IDP for cultural resources and human skeletal remains is based on **RCW 27.53**, **RCW 68.50.645,** **RCW 27.44.055**, and **RCW 68.60.055** and **recommended language** from the Department of Archaeology and Historic Preservation (DAHP).

1.4 INADVERDENT DISCOVERY PLAN FOR CULTURAL RESOURCES

A. If cultural resources are found during a project, activity in the immediate area of the find should be discontinued (**stop**), the area secured (**protect**), and the WSPRC archaeologists notified to assess the find (**notify**). ***When in doubt, assume the material is a cultural resource and implement the IDP outlined below.***

B. **Recognizing Cultural Resources-***Types of Historic/Prehistoric Artifacts and/or Activity Areas That May Be Found*

1. Artifacts- Both historic and prehistoric artifacts may be found exposed in backhoe trenches or back dirt piles.

    a) Prehistoric artifacts may range from finished tools such as stone pestles, arrowheads/projectile points, shell beads, or polished bone tools to small pieces or "flakes" or "chips" of exotic stone such as chert, jasper, or obsidian.
    b) Historic artifacts may include older (more than 50 years) nails, plates/ceramics, bottles, cans, coins, glass insulators, or bricks. See Special Conditions in Paragraph 1.1B.
    c) Old abandoned industrial materials from farming, logging, railways, lighthouses, and military installations.

2. Activity Area/Cultural Features- While excavating trench lines look for evidence of buried activity areas/cultural features such as old campfire hearths or buried artifacts.

    a) An area of charcoal or very dark stained soil with artifacts or burned rocks may be a fire hearth.
    b) A concentration of shell with or without artifacts may be shell midden deposits.
    c) Modified or stripped trees, often cedar or aspen, or other modified natural features, such as rock drawings or carvings

3. Historic building foundation/structural remains- During excavation, buried historic structures (e.g., privies, building foundations) that are more than 50 years old may be found.
4. Bone- Complete or broken pieces of bones may be discovered exposed in trench walls or in back dirt piles. Bone of recent age is usually transparent or white in color. Older bone is usually found in various shades of brown. Burned bone is usually black or, if heavily burned, bluish-white.

C. STEPS TO TAKE IF A CULTURAL RESOURCE IS FOUND DURING CONSTRUCTION

1. **Stop** if a cultural resource(s) is observed or suspected, all work within the immediate area of the discovery must stop.
2. **Protect** the area from further disturbance. Do not touch, move, or further disturb the exposed materials/artifacts. Create a protected area with temporary fencing, flagging, stakes, or other clear markings that is large enough (30 feet or larger) to protect the discovery location area. The WSPRC archaeologist can help determine the size of the protected area. Do not permit vehicles, equipment, or unauthorized personnel to traverse the discovery site.
3. **Notify** the WSPRC archaeologist. If the area needs to be secured, notify the Park Ranger or Park staff as well.
4. If requested by the WSPRC archaeologist, take photographs with a scale (e.g., pen, coin, etc.) and collect geospatial information of the discovery site to document the initial finds.

D. WHAT NOT TO DO IF A CULTURAL RESOURCE IS FOUND DURING CONSTRUCTION

1. Do not remove any artifacts from the site of the discovery.
2. Do not dig out objects protruding from any trench walls as this may cause further damage to artifacts and/or destroy important contextual information.
3. Do not share any information about the find, including on social media, except as necessary to implement the IDP.

E. WHAT HAPPENS NEXT?

1. The find will be assessed by a professional archaeologist (may be a WSPRC archaeologist or an archaeology consultant).

    a) If the find is not a cultural resource, construction work may resume.
    b) If the find is a cultural resource, the WSPRC archaeologist will contact the DAHP and affected Tribes, as appropriate, to develop a suitable treatment plan for the resource.

2. Construction work may resume in the protected area after the WSPRC archaeologist assigned to the undertaking has determined that the find has been adequately investigated and, if necessary, a treatment plan and monitor are in place to protect any remaining archaeological deposits.

1.5 INADVERDENT DISCOVERY PLAN FOR HUMAN SKELETAL REMAINS

A. Native American burials and historic grave sites are uncommon features on Washington State Park lands. These remains, as well as any associated artifacts or funerary objects, are protected under state law and, if the park is a federal lease, applicable federal law. If you discover human remains (or bones that you believe may be human remains) during construction, please follow these important instructions. It is imperative that reporting and treatment of any human remains found during construction or any ground-disturbing activities are treated with utmost dignity and respect.

B. Steps to Take If Human Skeletal Remains are Found During Construction

1. **Stop** if human skeletal remains observed or suspected, all work within the immediate area of the discovery must stop.
2. **Protect** the area from further disturbance. Do not touch, move, or further disturb the remains. Cover the remains with a tarp or other materials (not soil or rocks) for temporary protection in place and shield them from being photographed. Create a protected area with temporary fencing, flagging, stakes, or other clear markings that is large enough (30 feet or larger) to protect the discovery location area. The WSPRC archaeologist can help determine the size of the protected area. Do not permit vehicles, equipment, or unauthorized personnel to traverse the discovery site.
3. **Notify** law enforcement and the appropriate county medical examiner/coroner as soon as possible. If you are unsure if the remains are human, the physical anthropologist at DAHP may be called. Also notify the Park Ranger, the WSPRC archaeologist, and the WSPRC Curator of Collections/NAGRPA Specialist of the discovery of the remains.
4. If requested by law enforcement, the county coroner/examiner, the DAHP physical anthropologist, or the WSPRC archaeologist, take photographs with a scale (e.g., pen, coin, etc.) and geospatial information of the discovery site to document the initial finds.

C. What Not to Do If Human Skeletal Remains are Found During Construction

1. Do not pick up or remove anything.
2. Do not take any photographs of the remains unless instructed to do so by law enforcement, the county coroner/examiner, the DAHP physical anthropologist, or the WSPRC archaeologist. If pictures are requested, be prepared to photograph them with a scale (e.g., pen, coin, etc.) and collect geospatial information of the remains.
3. Do not call 911 unless you cannot reach law enforcement or the coroner/examiner by other means.

4. Do not share any information about the find, including on social media, except as necessary to implement the IDP.

D. **What Happens Next?**

1. The county medical examiner/coroner will assume jurisdiction over the human skeletal remains and decide whether those remains are forensic (crime-related) or non-forensic.

   a) If forensic, the county medical examiner/coroner will retain jurisdiction over the remains.
   b) If non-forensic, the county medical examiner/coroner will report that finding to the DAHP who will then take jurisdiction over the remains. The DAHP will notify any appropriate cemeteries and all affected Tribes of the remains. The State Physical Anthropologist will decide whether the remains are Indian or Non-Indian and report that finding to any appropriate cemeteries and the affected Tribes. The DAHP will then handle all consultation with the affected parties as to the future preservation, excavation, and disposition of the remains.

      Note: The WSPRC archaeologist assigned to the undertaking will be coordinating and consulting with the DAHP, affected Tribes, and other groups as necessary. Additionally, WSPRC's Curator of Collections/NAGPRA Specialist should be included on all written and/or verbal correspondence until the remains have been officially transferred from WSPRC's possession to an outside authority. Until the remains are transferred off of WSPRC's property, it is the responsibility of the Curator of Collections/NAGPRA Specialist to document and track the information regarding all human remains and associated funerary objects (including all material from excavation areas/units from which the human remains were removed).

2. Construction work may resume in the protected area after the WSPRC archaeologist assigned to the undertaking has determined that the find has been adequately investigated and, if necessary, a treatment plan and monitor are in place.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 013591 - HISTORIC TREATMENT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes general protection and treatment procedures for the entire Project and following specific work:

1. Historic removal and dismantling.

1.2 DEFINITIONS

A. Consolidate: To strengthen loose or deteriorated materials in place.

B. Dismantle: To disassemble and detach items by hand from existing construction to the limits indicated, using small hand tools and small one-hand power tools, so as to protect nearby historic surfaces; and legally dispose of dismantled items off-site, unless indicated to be salvaged or reinstalled.

C. Existing to Remain: Existing items that are not to be removed or dismantled.

D. Historic: Spaces, areas, rooms, surfaces, materials, finishes, and overall appearance which are important to the successful preservation of the building as determined by Project Representative. Designated historic spaces, areas, surfaces, and finishes are indicated on the Drawings.

E. Match: To blend with adjacent construction and manifest no apparent difference in material type, species, cut, form, detail, color, grain, texture, or finish; as approved by Project Representative.

F. Reconstruct: To remove existing item, replicate damaged or missing components, and reinstall in original position.

G. Refinish: To remove existing finishes to base material and apply new finish to match original, or as otherwise indicated.

H. Reinstall: To protect removed or dismantled item, repair and clean it as indicated for reuse, and reinstall it in original position, or where indicated.

I. Remove: Specifically for historic spaces, areas, rooms, and surfaces, the term means to detach an item from existing construction to the limits indicated, using hand tools and hand-operated power equipment, and legally dispose of it off-site, unless indicated to be salvaged or reinstalled.

J. Repair: To correct damage and defects, retaining existing materials, features, and finishes while employing as little new material as possible. Includes patching, piecing-in, splicing, consolidating, or otherwise reinforcing or upgrading materials.

K. Replace: To remove, duplicate, and reinstall entire item with new material. The original item is the pattern for creating duplicates unless otherwise indicated.

L. Replicate: To reproduce in exact detail, materials, and finish, unless otherwise indicated.

M. Reproduce: To fabricate a new item, accurate in detail to the original, and in either the same or a similar material as the original, unless otherwise indicated.

N. Restore: To consolidate, replicate, reproduce, repair, and refinish as required to achieve the indicated results.

O. Retain: To keep existing items that are not to be removed or dismantled.

P. Reversible: New construction work, treatments, or processes that can be removed or undone in the future without damaging historic materials, unless otherwise indicated.

Q. Salvage: To protect removed or dismantled items and deliver them to Owner, ready for reuse.

R. Stabilize: To provide structural reinforcement of unsafe or deteriorated items while maintaining the essential form as it exists at present; also, to reestablish a weather-resistant enclosure.

S. Strip: To remove existing finish down to base material, unless otherwise indicated.

1.3 SUBMITTALS

A. Historic Treatment Program: Submit before work begins.

B. Fire-Prevention Plan: Submit before work begins.

1.4 QUALITY ASSURANCE

A. Historic Treatment Program: Prepare a written plan for historic treatment for the whole Project, including each phase or process and protection of surrounding materials during operations. Describe in detail materials, methods, and equipment to be used for each phase of work. Show compliance with indicated methods and procedures specified in this and other sections.

1. Dust and Noise Control: Include locations of proposed temporary dust- and noise-control partitions and means of egress from occupied areas coordinated with continuing on-site operations and other known work in progress.

B. Fire-Prevention Plan: Prepare a written plan for preventing fires during the Work, including placement of fire extinguishers, fire blankets, rag buckets, and other fire-prevention devices during each phase or process. Include each fire watch's training, duties, and authority to enforce fire safety.

C. Regulatory Requirements: Comply with governing EPA notification regulations before beginning removal and dismantling work. Comply with hauling and disposal regulations of Authorities Having Jurisdiction.

D. Standards: Comply with ANSI/ASSE A10.6.

E. Historic Treatment Preconstruction Conference: Conduct conference as part of the Preconstruction Conference.

1.5 STORAGE AND PROTECTION OF HISTORIC MATERIALS

A. Salvaged Historic Materials:

1. Clean only loose debris from salvaged historic items unless more extensive cleaning is indicated.
2. Pack or crate items after cleaning; cushion against damage during handling. Label contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Protect items from damage during transport and storage.

B. Historic Materials for Reinstallation:

1. Repair and clean historic items as indicated and to functional condition for reuse.
2. Pack or crate items after cleaning and repairing; cushion against damage during handling. Label contents of containers.
3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment unless otherwise indicated. Provide connections, supports, and miscellaneous materials to make item functional for use indicated.

C. Existing Historic Materials to Remain: Protect construction indicated to remain against damage and soiling from construction work. Where permitted by Project Representative, items may be dismantled and taken to a suitable, protected storage location during construction work and reinstalled in their original locations after historic treatment and construction work in the vicinity is complete.

D. Storage and Protection: When taken from their existing locations, catalog and store historic items within a weathertight enclosure where they are protected from wetting by rain, snow, condensation, or ground water, and from freezing temperatures.

1. Identify each item with a nonpermanent mark to document its original location. Indicate original locations on plans elevations, sections, or photographs by annotating the identifying marks.
2. Secure stored materials to protect from theft.

1.6 PROJECT CONDITIONS

A. Hazardous Materials: See Project Conditions Subsection in Section 010000 - General Requirements.

B. Storage or sale of removed or dismantled items on-site is not permitted.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Preparation for Removal and Dismantling: Examine construction to be removed or dismantled to determine best methods to safely and effectively perform removal and dismantling work. Examine adjacent work to determine what protective measures will be necessary. Make explorations, probes, and inquiries as necessary to determine condition of construction to be removed or dismantled and location of utilities and services to remain that may be hidden by construction that is to be removed or dismantled.

1. Verify that affected utilities have been disconnected and capped.
2. Inventory and record the condition of items to be removed and dismantled for reinstallation or salvage.
3. Before removal or dismantling of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.
4. Engage a Professional Engineer to survey condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures as a result of removal and dismantling work.

B. Survey of Existing Conditions: Record existing conditions by use of measured drawings, preconstruction photographs, or other means as approved by Project Representative.

C. Perform surveys as the Work progresses to detect hazards resulting from historic treatment procedures.

3.2 PROTECTION, GENERAL

A. Ensure that supervisory personnel are on-site and on duty when historic treatment work begins and during its progress.

B. Protect persons, motor vehicles, surrounding surfaces of building, building site, plants, and surrounding buildings from harm resulting from historic treatment procedures.

1. Use only proven protection methods, appropriate to each area and surface being protected.
2. Provide barricades, barriers, and temporary directional signage to exclude public from areas where historic treatment work is being performed.
3. Erect temporary protective covers over walkways and at points of pedestrian and vehicular entrance and exit that must remain in service during course of historic treatment work.
4. Contain dust and debris generated by removal and dismantling work and prevent it from reaching the public or adjacent surfaces.
5. Provide shoring, bracing, and supports as necessary. Do not overload structural elements.
6. Protect floors and other surfaces along haul routes from damage, wear, and staining.

C. Temporary Protection of Historic Materials:

1. Protect existing historic materials with temporary protections and construction. Do not deface or remove existing materials.
2. Do not attach temporary protection to historic surfaces except as indicated as part of the historic treatment program and approved by Project Representative.

D. Comply with each product manufacturer's written instructions for protections and precautions. Protect against adverse effects of products and procedures on people and adjacent materials, components, and vegetation.

E. Utility and Communications Services:

1. Notify the Owner, Project Representative, and Authorities Having Jurisdiction, owning or controlling wires, conduits, pipes, and other services affected by the historic treatment work before commencing operations.
2. Disconnect and cap pipes and services as required by Authorities Having Jurisdiction, as required for the historic treatment work.
3. Maintain existing services unless otherwise indicated; keep in service, and protect against damage during operations. Provide temporary services during interruptions to existing utilities.

F. Existing Drains: Prior to the start of work in an area, test drainage system to ensure that it is functioning properly. Notify Project Representative immediately of inadequate drainage or blockage. Do not begin work in an area until the drainage system is in working order.

1. Prevent solids such as stone or mortar residue from entering the drainage system. Clean out drains and drain lines that become sluggish or blocked by sand or other materials resulting from historic treatment work.
2. Protect drains from pollutants. Block drains or filter out sediments, allowing only clean water to pass.

3.3 PROTECTION DURING APPLICATION OF CHEMICALS

A. Protect motor vehicles, surrounding surfaces of building being restored, building site, plants, and surrounding buildings from harm or damage resulting from applications of chemical cleaners and paint removers.

B. Cover adjacent surfaces with protective materials that are proven to resist chemicals selected for Project unless chemicals being used will not damage adjacent surfaces as indicated in historic treatment program. Use covering materials and masking agents that are waterproof, UV-resistant, and will not stain or leave residue on surfaces to which they are applied. Apply protective materials according to manufacturer's written instructions. Do not apply liquid masking agents or adhesives to painted or porous surfaces. When no longer needed, promptly remove protective materials staining.

C. Do not apply chemicals during winds of sufficient force to spread them to unprotected surfaces.

D. Neutralize and collect alkaline and acid wastes and legally dispose of off Owner's property.

E. Collect and dispose of runoff from chemical operations by legal means and in a manner that prevents soil contamination, soil erosion, undermining of paving and foundations, damage to landscaping, or water penetration into building interior.

3.4 PROTECTION FROM FIRE

A. General: Follow fire-prevention plan and the following.

1. Comply with NFPA 241 requirements unless otherwise indicated. Contractor to Perform duties entitled "Owner's Responsibility for Fire Protection."
2. Remove and keep area free of combustibles including, rubbish, paper, waste, and chemicals, except to the degree necessary for the immediate work.

    a. If combustible material cannot be removed, provide fire blankets to cover such materials.

B. Heat-Generating Equipment and Combustible Materials: Comply with the following procedures while performing work with heat-generating equipment or highly combustible materials, including welding, torch-cutting, soldering, brazing, paint removal with heat, or other operations where open flames or implements utilizing high heat or combustible solvents and chemicals are anticipated.

1. Obtain Owner's approval for operations involving use of open-flame or welding or other high-heat equipment. Notify Owner before each occurrence, indicating location of such work.
2. As far as practical, restrict heat-generating equipment to shop areas or outside the building.
3. Do not perform work with heat-generating equipment in or near rooms or in areas where flammable liquids or explosive vapors are present or thought to be present. Use a combustible gas indicator test to ensure that the area is safe.
4. Use fireproof baffles to prevent flames, sparks, hot gasses, or other high-temperature material from reaching surrounding combustible material.
5. Prevent the spread of sparks and particles of hot metal through open windows, doors, holes, and cracks in floors, walls, ceilings, roofs, and other openings.
6. Fire Watch: Before working with heat-generating equipment or highly combustible materials, station personnel to serve as a fire watch at each location where such work is performed. Fire watch personnel shall have the authority to enforce fire safety. Station fire watch according to NFPA 51B, NFPA 241, and as follows.

    a. Train each fire watch in the proper operation of fire-control equipment and alarms.
    b. Prohibit fire-watch personnel from other work that would be a distraction from fire-watch duties.
    c. Cease work with heat-generating equipment whenever fire-watch personnel are not present.
    d. Have fire watch perform final fire-safety inspection each day beginning no sooner than 30 minutes after conclusion of work at each area of the Project site to detect hidden or smoldering fires and to ensure that proper fire-prevention is maintained.
    e. Maintain fire-watch personnel at each area of the Project site until 60 minutes after conclusion of daily work.

C. Fire Extinguishers, Fire Blankets, and Rag Buckets: Maintain fire extinguishers, fire blankets, and rag buckets for disposal of rags with combustible liquids. Maintain each as suitable for the type of fire risk in each work area. Ensure that nearby personnel and the fire watch are trained in fire-extinguisher and blanket operation.

3.5 GENERAL HISTORIC TREATMENT

A. Ensure that supervisory personnel are present when historic treatment work begins and during its progress.

B. Halt the process of deterioration and stabilize conditions, unless otherwise indicated. Perform work as indicated on Drawings. Follow the procedures in subparagraphs below and procedures approved in historic treatment program.

1. Retain as much existing material as possible; repair and consolidate rather than replace.
2. Use additional material or structure to reinforce, strengthen, prop, tie, and support existing material or structure.
3. Use reversible processes wherever possible.
4. Use historically accurate repair and replacement materials and techniques unless otherwise indicated.

C. Notify Project Representative of visible changes in the integrity of material or components whether due to environmental causes including biological attack, UV degradation, freezing, or thawing; or due to structural defects including cracks, movement, or distortion.

1. Do not proceed with the work in question until directed by Project Representative.

D. Where missing features are indicated to be repaired or replaced, provide features whose designs are based on accurate duplications rather than on conjectural designs, subject to the approval of Project Representative.

E. Where Work requires existing features to be removed or dismantled and reinstalled, perform these operations without damage to the material itself, to adjacent materials, or to the substrate.

F. Identify new and replacement materials and features with permanent marks hidden in the completed work to distinguish them from original materials. Record a legend of identification marks and the locations of the items on As-Built Drawings.

3.6 HISTORIC REMOVAL AND DISMANTLING

A. General: Have removal and dismantling work performed by a qualified historic treatment specialist.

B. Perform work in accordance with the historic treatment program.

C. Water-Mist Sprinkling: Use water-mist sprinkling and other wet methods to control dust only with adequate, approved procedures and equipment that ensure that such water will not create a hazard or adversely affect other building areas or materials.

D. Anchorages:

1. Remove anchorages associated with removed items.
2. Dismantle anchorages associated with dismantled items.
3. In historic surfaces, patch or repair holes created by anchorage removal or dismantling in accordance with Section specific to the historic surface being patched.

END OF SECTION

SECTION 014000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for quality assurance and quality control.

B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.

1. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
2. Requirements for Contractor to provide quality-assurance and -control services required by Project Representative, Owner, or Authorities Having Jurisdiction are not limited by provisions of this Section.

C. Related Requirements:

1. Divisions 02 through 49 Sections for specific test and inspection requirements.

1.2 DEFINITIONS

A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Project Representative.

C. Mockups: Full-size physical assemblies that are constructed on-site. Mockups are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and, where indicated, qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.

D. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.

E. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to Authorities Having Jurisdiction, to establish product performance and compliance with specified requirements.

F. Source Quality-Control Testing: Tests and inspections that are performed at the source, e.g., plant, mill, factory, or shop.

G. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

I. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.

1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).

1.3 CONFLICTING REQUIREMENTS

A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Project Representative for a decision before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Project Representative for a decision before proceeding.

1.4 QUANTITY SHEETS/WEIGHT TICKETS

A. For bulk items, supply quantity sheets (load receipts) to account for each load delivered to the jobsite. Deliver quantity sheets to Inspector on job at delivery time. If Inspector is not on job, deliver quantity sheets on a daily basis to place designated by Project Representative.

B. No payment shall be made for materials delivered for which quantity tickets have not been turned into Inspector or delivered to designated place at end of working day. Backdated tickets are not acceptable as a basis for payment, except at Project Representative's discretion.

C. No payment for materials will be made until proper accounting has been made. Final quantity records are approved by Project Representative, with payment at Project Representative's discretion.

1.5 INFORMATIONAL SUBMITTALS

A. Contractor's Statement of Responsibility: When required by Authorities Having Jurisdiction, submit copy of written statement of responsibility sent to Authorities Having Jurisdiction before starting work on the following systems:

1. Seismic-force-resisting system, designated seismic system, or component listed in the designated seismic system quality-assurance plan prepared by Engineer.
2. Main wind-force-resisting system or a wind-resisting component listed in the wind-force-resisting system quality-assurance plan prepared by Engineer.

B. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

1.6 REPORTS AND DOCUMENTS

A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:

1. Date of issue.
2. Project title and number.
3. Name, address, and telephone number of testing agency.
4. Dates and locations of samples and tests or inspections.
5. Names of individuals making tests and inspections.
6. Description of the Work and test and inspection method.
7. Identification of product and Specification Section.
8. Complete test or inspection data.
9. Test and inspection results and an interpretation of test results.
10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.
13. Recommendations on retesting and reinspecting.

B. Manufacturer's Field Reports: Prepare written information documenting tests and inspections specified in other Sections. Include the following:

1. Name, address, and telephone number of representative making report.
2. Statement on condition of substrates and their acceptability for installation of product.
3. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
4. Results of operational and other tests and a statement of whether observed performance complies with requirements.
5. Other required items indicated in individual Specification Sections.

C. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee

payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.7 QUALITY ASSURANCE

A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar in material, design, and extent to those indicated for this Project.

F. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E329; and with additional qualifications specified in individual Sections; and, where required by Authorities Having Jurisdiction, that is acceptable to authorities.

1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.

G. Manufacturer's Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

H. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:

1. Build mockups in location and of size indicated or, if not indicated, as directed by Project Representative.
2. Notify Project Representative at least 7 calendar days in advance of dates and times when mockups will be constructed.
3. Demonstrate the proposed range of aesthetic effects and workmanship.

4. Obtain Project Representative's approval of mockups before starting work, fabrication, or construction.

    a. Allow seven days for initial review and each re-review of each mockup.

5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
6. Demolish and remove mockups when directed unless otherwise indicated.

1.8 QUALITY CONTROL

A. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.

1. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.

    a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.

2. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

B. Manufacturer's Field Services: Where indicated, engage a manufacturer's representative to observe and inspect the Work. Manufacturer's representative's services include examination of substrates and conditions, verification of materials, inspection of completed portions of the Work, and submittal of written reports.

C. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.

D. Testing Agency Responsibilities: Cooperate with Project Representative and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify Project Representative and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.

5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
6. Do not perform any duties of Contractor.

E. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:

1. Access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
4. Facilities for storage and field curing of test samples.

F. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

1.9 SPECIAL TESTS AND INSPECTIONS

A. Special Tests and Inspections: Owner will engage a qualified testing agency or special inspector to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, and as follows:

1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviews the completeness and adequacy of those procedures to perform the Work.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:

1. Date test or inspection was conducted.
2. Description of the Work tested or inspected.
3. Date test or inspection results were transmitted to Project Representative.
4. Identification of testing agency or special inspector conducting test or inspection.

B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Project Representative's and Authority Having Jurisdiction’s reference during normal working hours.

3.2 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible.

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION

SECTION 014100 - REGULATORY REQUIREMENTS

PART 1 - GENERAL

1.1 PERMITS, CODES AND REGULATIONS

A. The following permits have been applied for (or are on file) and incorporated into the contract:

1. S.E.P.A.
2. Building

B. Conform with the requirements of listed permits and additional or other applicable permits, codes, and regulations as may govern Work.

C. Obtain and pay fees for licenses, permits, inspections, and approvals required by laws, ordinances, and rules of appropriate governing or approving agencies necessary for proper completion of Work (other than those listed under item 1.1A. above and Special Inspections called for by the International Building Code).

D. Conform with current applicable codes, regulations and standards, which is the minimum standard of quality for material and workmanship. Provide labor, materials, and equipment necessary for compliance with code requirements or interpretations, although not specifically detailed in the Drawings or specifications. Be familiar with applicable codes and standards prior to bidding.

E. Process through Project Representative, requests to extend, modify, revise, or renew any of the permits (listed in 1.1A above). Furnish requests in writing and include a narrative description and adequate Drawings to clearly describe and depict proposed action. Do not contact regulatory agency with requests for permit extensions, modifications, revisions, or renewals without the prior written consent of Project Representative.

1.2 VARIATIONS WITH CODES, REGULATIONS AND STANDARDS

A. Nothing in the drawings and specifications permits Work not conforming to codes, permits or regulations. Promptly submit written notice to Project Representative of observed variations or discrepancies between the Contract documents and governing codes and regulations.

B. Appropriate modifications to the Contract documents will be made by Change Order to incorporate changes to Work resulting from code and/or regulatory requirements. Contractor assumes responsibility for Work contrary to such requirements if Work proceeds without notice.

C. Contractor is not relieved from complying with requirements of Contract documents which may exceed, but not conflict with requirements of governing codes.

1.3 COORDINATION WITH REGULATORY AGENCIES

A. Coordinate Work with appropriate governing or regulating authorities and agencies.

B. Provide advance notification to proper officials of Project schedule and schedule revisions throughout Project duration, in order to allow proper scheduling of inspection visits at proper stages of Work completion.

C. Regulation coordination is in addition to inspections conducted by Project Representative. Notify Project Representative of scheduled inspections involving outside regulating officials, to allow Project Representative to be present for inspections.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 014200 – REFERENCES

PART 1 - GENERAL

1.1 DEFINITIONS

A. General: Basic Contract definitions are included in the General Conditions of the Contract.

B. "Approved": When used to convey Project Representative's action on Contractor's submittals, applications, and requests, "approved" is limited to Project Representative's duties and responsibilities as stated in the General Conditions of the Contract.

C. "Directed": A command or instruction by Project Representative. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."

D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."

E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.

F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

G. "Install": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

H. "Provide": Furnish and install, complete and ready for the intended use.

I. “Project Engineer”, “Project Architect”, “Engineer”, and “Architect” are interchangeable terms.

J. Project Representative and Owners Representative are interchangeable terms.

K. “As-built Drawings”: Drawings done by the Contractor in the field showing changes to the Work.

L. “Record Drawings”: Drawings prepared based on the information on the As-built Drawings.

1.2 GENERAL

A. Applicable standards of the construction industry have the same force and effect (and are made a part of the Contract Documents by reference) as if directly copied or bound herein.

1.3 PUBLICATION DATES

A. Where compliance with an industry standard is required, comply with the standard in effect on Bid Date.

1.4 ABBREVIATIONS AND NAMES

A. The following acronyms or abbreviations, referenced in the Contract documents, are defined to mean the associated name. Applicable standards include, but are not limited to the following:

1.	AASHTO	American Association of State Highway & Transportation Officials
2.	ACI	American Concrete Institute
3.	AGA	American Gas Association
4.	AI	Asphalt Institute
5.	AIA	American Institute of Architects (The)
6.	AISC	American Institute of Steel Construction, Inc.
7.	AISI	American Iron and Steel Institute
8.	AITC	American Institute of Timber Construction
9.	ANSI	American National Standards Institute
10.	APA	Engineered Wood Association (The)
11.	APWA	American Public Works Association
12.	ASME	American Society of Mechanical Engineers
13.	ASTM	American Society for Testing and Materials International
14.	AWPA	American Wood Protection Association
15.	AWS	American Welding Society
16.	AWWA	American Water Works Association
17.	CRSI	Concrete Reinforcing Steel Institute
18.	EPA	Environmental Protection Agency
19.	HPVA	Hardwood Plywood and Veneer Association
20.	IBC	International Building Code
21.	IEEE	Institute of Electrical & Electronics Engineers, Inc. (The)
22.	IES	Illuminating Engineering Society of North America
23.	LPI	Lighting Protection Institute
24.	MCAA	Mechanical Contractors Association of America, Inc.
25.	NIST	National Institute of Standards and Technology
26.	NCMA	National Concrete Masonry Association
27.	NEC	National Electrical Code
28.	NECA	National Electrical Contractors Association, Inc.
29.	NFPA	National Fire Protection Association
30.	NHLA	National Hardwood Lumber Association
31.	NSF	National Sanitation Foundation International
32.	OSHA	Occupational Safety & Health Administration
33.	PCA	Portland Cement Association, (The)
34.	SEPA	State Environmental Policy Act
35.	UL	Underwriters Laboratories, Inc.
36.	UPC	Uniform Plumbing Code
37.	WCLIB	West Coast Lumber Inspection Bureau (Grading Rules)
38.	WRI	Wire Reinforcement Institute
39.	WSDOE or ECY	Washington State Department of Ecology
40.	WSDOH or DOH	Washington State Department of Health

41. WSDOT Washington State Department of Transportation
42. WSPRC Washington State Parks and Recreation Commission
43. WWPA Western Wood Products Association (Grading Rules)

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 015000 – TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 PROTECTION OF PROPERTY AND EXISTING FACILITIES

A. Provide protections necessary to prevent damage to park property and facilities.

B. Only rubber-tired equipment are permitted to operate on paved park roads.

C. Protect existing trees and other vegetation indicated to remain in place against cutting, breaking or skinning of roots, skinning and bruising of bark, or smothering of trees by stockpiling materials within dripline. Provide necessary temporary guards to protect trees and vegetation to remain in place.

D. Make every effort to minimize damage and cutting major tree roots during excavation operations. Provide protection for larger tree roots exposed or cut during excavation operations.

1.2 ENVIRONMENTAL PROTECTIONS

A. Scope:

1. Provide labor, materials, equipment and perform Work required for protection of environment during and as a result of construction operations under contract.

B. Applicable Regulations:

1. Comply with applicable federal, state and local laws and regulations concerning environmental pollution control and abatement, and specific requirements elsewhere in specifications and drawings to prevent and provide for control of environmental pollution.

C. Protection of Land Resources:

1. Give special attention to the effect of Contractor’s operations upon surroundings. Take special care to maintain natural surroundings undamaged and conduct Work in compliance with following requirements:

    a. When Work is completed, remove storage and other Contractor buildings and facilities, and sites restored to a neat and presentable condition appropriate to surrounding landscape, unless otherwise specified. Remove debris resulting from Contractor's operation.
    b. Store petroleum products, industrial chemicals and similar toxic or volatile materials in durable containers approved by the Authority Having Jurisdiction and located in areas where accidental spillage will not enter water. Store substantial quantities of materials in an area surrounded by containment dikes of sufficient capacity to contain an aggregate capacity of tanks.

D. Protection and Restoration of Property:

1. Preserve public and private property, monuments, power and telephone lines, other utilities, prevention of damage to natural environment, etc., insofar as they may be endangered by Work.
2. When or where any direct or indirect damage or injury is done to public or private property by or on account of any act, omission, neglect or misconduct in execution of Work, or in consequence of non-execution of Contractor, restore, or have restored at Contractor's expense, such property to a condition similar and equal to that existing before such damage or injury was done, by repairing, rebuilding, or otherwise restoring same, or make good damage or injury in some other manner acceptable to Project Representative.

E. Protection of Water Resources:

1. Perform Work not to create conditions injurious to fish or to their habitat, or which would make water unsuitable for private, municipal, or industrial use.
2. Take special measures to prevent chemicals, fuels, oils, grease, bituminous materials, waste washings, herbicides, insecticides, lime, wet concrete, cement, silt or organic or other deleterious material from entering waterways.
3. Dispose of offsite, in a lawful manner conforming to applicable local, state and federal laws wastes, effluents, trash, garbage, oil, grease, chemicals, cement, bitumen, etc., petroleum, and chemical products or wastes containing such products. Furnish Owner with documentation showing compliance with this requirement.
4. Conform to applicable local, state and federal laws for disposal of effluents. Dispose of waters used to wash down equipment in a manner to prevent their entry into a waterway. If waste material is dumped in unauthorized areas, remove material and restore area to condition of adjacent, undisturbed area. If necessary, excavate contaminated ground and disposed of as directed by Project Representative and replace with suitable compacted fill material with surface restored to original condition.

F. Dust Control:

1. Dust control is required on roads used by Contractor. Maintain excavations, embankments, stockpiles, roads, plant sites, waste areas, borrow areas and other Work areas within or without the Project boundaries free from dust which would cause a hazard or nuisance to others. Provide approved, temporary methods of stabilization consisting of sprinkling, chemical treatment, light bituminous treatment or equal methods to control dust. If sprinkling is used, sprinkling must be repeated at intervals to keep disturbed areas at least damp.

G. Temporary Water Pollution/Erosion Controls:

1. Provide for prevention, control and abatement of soil erosion and water pollution within the limits of Project, to prevent and/or minimize damage to adjacent bodies of water and Work itself.
2. Coordinate temporary soil erosion/water pollution control measures with permanent drainage and erosion control Work to ensure effective and continuous controls are maintained throughout Project life.

3. Develop a written spill prevention and response plan for construction activities adjacent to/and over any surface waters and/or wetlands. "Adjacent" means within 150' as measured on a horizontal plane. Plan addresses:

    a. Narrative description of the proposed construction methods, materials, and equipment to be used for Work
    b. Assessment and listing of hazardous materials and/or potential contaminants that could be released during execution of Work
    c. SDS sheets with cleanup instructions for potential contaminants
    d. Spill response/cleanup materials and instructions for use
    e. Procedures and precautions to prevent spills
    f. Spill response training for on-site personnel, including the location of the containment and cleanup materials at site
    g. Emergency notification in case of a spill or release. Park Manager and Project Representative must be included on the list of notified.

4. Comply with applicable codes and ordinances for spill prevention and response plan and submit a copy to Project Representative before commencing Work adjacent to or over any waters and/or wetlands.

H. Emergency Spill Response Notification

1. Under state law, Ecology must be notified when any amount of regulated waste or hazardous material that poses an imminent threat to life, health, or the environment is released to the air, land, or water, or whenever oil is spilled on land or to waters of the state. The spiller is always responsible for reporting a spill. Failure to report a spill in a timely manner may result in enforcement actions. If you are not responsible for a spill, making the initial notification does not make you liable. However, please consult with Ecology's response team before attempting any type of response or cleanup. Also notify Park Manager and Project Representative.
2. If oil or hazardous materials are spilled to state waters, the spiller must notify both federal and state spill response agencies. The federal agency is the National Response Center at 1-800-424-8802. For state notification, call the Washington Emergency Management Division (EMD) at 1-800-258-5990 or 1-800-OILS-911 AND the appropriate Ecology regional office for your county (see numbers below). An Ecology spill responder will normally call reporting party back to gather more information. The agency will then determine its response actions. Also notify Park Manager and Project Representative.
3. Ecology Regional Spill Reporting Numbers:
    a. Central Regional Office: (509) 575-2490 (Benton, Chelan, Douglas, Kittitas, Klickitat, Okanogan, and Yakima counties)
    TDD: Washington Relay Service 711 or (800) 833-6388.

1.3 PARK TRAFFIC/PEDESTRIAN CONTROLS

A. Properly warn the public of construction equipment and activities, open trenches, and/or other unsafe conditions by providing all necessary warning equipment. Equipment includes warning signs, barricades, fencing, flashing lights and traffic control personnel (flaggers).

B. Conduct operations with the least possible obstruction and inconvenience to the public in accordance with appropriate Section(s) of the WSDOT "Standard Specifications".

1.4 PROTECTION OF WORK

A. Protect Work, materials, and equipment against damage, weather conditions, or other hazards. Equipment, Work or materials found damaged or in other than new condition will be rejected by Project Representative.

1.5 REMOVAL AND REPLACEMENT OF STATE-OWNED ITEMS

A. Should any state-owned items, such as signs, bumper blocks, or related items, interfere with the proper construction process, remove and reinstall such items to the satisfaction of Project Representative.

1.6 USE OF PARK SPACE

A. Only in areas of park that Contract covers and only during active inclusive dates of Contract.

B. Contractor vehicle and equipment parking only as designated by Project Representative.

C. Contractor will be issued temporary parking passes for construction crew, vehicles and equipment, valid for the duration of the contract only.

1.7 ROADWAY CLOSURE

A. Closure of the park is not in the best interest of the general public, only close roads being trenched while conduits, etc., are being installed, and immediately reopened for traffic. Supply necessary barricades, etc., to effectively prevent automotive traffic from entering upon any traveled way while trenches are open, unless other approved appropriate safety measures are taken.

1.8 UTILITIES

A. Existing subsurface utilities on Project are represented on Contract Drawings to the best of the Commission's knowledge. It is Contractor's responsibility to verify existence of utilities and determine exact location and depth. Maintain use of utilities during construction through temporary connections or other measures suitable to Commission. No extra compensation will be made for removal, temporary connections, relocations, or replacement of utilities.

1.9 SERVICE OUTAGES

A. Coordinate and schedule outages for, power, water, and sewer service connections/repairs with Park Manager, so as not to inconvenience park staff or public.

1.10 SANITARY FACILITIES

A. Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of Authorities Having Jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 016000 – PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 COMMISSION FURNISHED ITEMS

A. The Commission furnishes no items except for the NPS-style interpretive panel mount shown on G101 and detail D/A601. Make all arrangements for and provide all materials required to accomplish the Work.

1.2 IMPLIED/INCIDENTAL MATERIALS

A. Minor materials required for proper Project completion although not specifically mentioned or shown in Contract documents, are part of materials to be provided by Contractor as a part of Contract and are considered incidental to the total cost of Project. No additional compensation is due to the Contractor for providing such items.

1.3 QUALITY OF MATERIALS

A. Materials are to be new, free from defects, and of quality specified in the drawings and specifications.

B. Select and provide materials to ensure satisfactory operation and rated life in prevailing environmental conditions were installed.

C. Same make and quality throughout the entire job, for each type. Furnish materials of latest standard design products of manufacturers regularly engaged in their production.

1.4 SPECIFIED MATERIALS

A. Drawings and specifications generally reference only one make and model for each item of material or equipment required. This is not intended to be restrictive but indicates the standard of quality, design, and features required.

B. Specified product is the basis of design regarding physical size, strength, and performance. Products named indicate minimum acceptable product and are "or equal" unless noted otherwise.

1.5 SUBSTITUTIONS

A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.

1. Conditions: Project Representative will consider Contractor's request for substitution when the following conditions are satisfied:

a. Requested substitution is consistent with Contract Documents and will produce indicated results.
b. Requested substitution provides sustainable design characteristics that specified product provided.
c. Requested substitution will not adversely affect Contractor's construction schedule.
d. Requested substitution has received necessary approvals of Authorities Having Jurisdiction.
e. Requested substitution is compatible with other portions of Work.
f. Requested substitution has been coordinated with other portions of Work.
g. Requested substitution provides specified warranty.
h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

B. Substitutions for Convenience: Project Representative will consider requests for substitution if received within 60 days after the Notice to Proceed.

1. Conditions: Project Representative will consider Contractor's request for substitution when the following conditions are satisfied:
a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Engineer for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
b. Requested substitution does not require extensive revisions to Contract Documents.
c. Requested substitution is consistent with Contract Documents and will produce indicated results.
d. Requested substitution will not adversely affect Contractor's construction schedule.
e. Requested substitution has received necessary approvals of Authorities Having Jurisdiction.
f. Requested substitution is compatible with other portions of Work.
g. Requested substitution has been coordinated with other portions of Work.
h. Requested substitution provides specified warranty.
i. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

1.6 SUBSTITUTION OF MATERIALS ("OR EQUAL")

A. Proposed equipment to be considered "or equal" will necessitate written approval by the Project Representative prior to substitution.

B. On requests for substitution of materials clearly define and describe proposed substitute.

C. Accompany requests by complete specifications, samples, records of performance, certified test reports, and such other information as the Project Representative may request to evaluate the substitute product.

D. Contractor is responsible for a substitute item suiting the installation requirements and for additional costs incurred as a result of substitution.

E. Final decisions regarding quality and suitability of proposed substitutions rests solely with Project Representative and will be based on information submitted.

1.7 TECHNICAL DATA

A. Technical data and information contained herein relies entirely on tests and ratings provided by manufacturers who are solely responsible for their accuracy. Project Representative, by use of this information in no way implies that Project Representative has tested or otherwise verified the results of published manufacturer's information.

1.8 DELIVERY, STORAGE AND HANDLING

A. Transport products by methods to avoid product damage. Only deliver products to the site that are undamaged and free from defects.

B. Provide proper equipment and personnel to handle and transport materials/products to the Project sites safely and undamaged.

C. Promptly inspect material to assure that products comply with Contract requirements, quantities are correct, and products are undamaged.

D. Store and/or stockpile materials and products only in areas of park designated and approved by Project Representative prior to delivery.

E. Arrange storage to provide easy access for inspections. Original product labels, certifications, stamps, etc. to be intact and readily visible for inspection purposes.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 017329 – CUTTING AND PATCHING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes procedural requirements for cutting and patching.

1.2 DEFINITIONS

A. Cutting: Removal of in-place construction necessary to permit installation or performance of other Work.

B. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of other Work.

1.3 SUBMITTALS

A. Cutting and Patching Proposal: For work not clearly indicated as cutting and patching on the drawings or specifications, submit a proposal describing procedures at least seven (7) days before the time cutting and patching will be performed, requesting approval to proceed. Include the following information, as applicable:

1. Extent: Describe cutting and patching, show how they will be performed, and indicate why they cannot be avoided.
2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building's appearance and other significant visual elements.
3. Products: List products to be used and firms or entities that will perform the Work.
4. Utility Services and Mechanical/Electrical Systems: List services/systems that cutting and patching procedures will disturb or affect. List services/systems that will be relocated and those that will be temporarily out of service. Indicate how long services/systems will be disrupted.
5. Structural Elements: Where cutting and patching involve adding reinforcement to structural elements, submit details and engineering calculations showing integration of reinforcement with original structure.
6. Roofing Elements: Where cutting and patching involve cutting and patching roofing. Submit product data and samples of roofing material to be used.
7. Noise and Dust Protection Plan.

B. Project Representative's Approval: Obtain approval of cutting and patching proposal before cutting and patching. Approval does not waive right to later require removal and replacement of unsatisfactory work.

1.4 QUALITY ASSURANCE

A. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity, load-deflection ratio, or seismic bracing capacity.

B. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Operating elements include the following:

1. Primary operational systems and equipment.
2. Air or smoke barriers.
3. Fire-suppression systems.
4. Mechanical systems piping and ducts.
5. Control systems.
6. Communication systems.
7. Conveying systems.
8. Electrical wiring systems.
9. Operating systems of special construction in Division 13 Sections

C. Miscellaneous Elements: Do not cut and patch miscellaneous elements or related components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.

D. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

E. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

1.5 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during cutting and patching operations, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections.

B. In-Place Materials: Use materials identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.

1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with in-place finishes or primers.
2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Temporary Support: Provide temporary support of Work to be cut.

B. Protection:

1. Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
2. Take precautions required by regulations and Standard Specifications to protect personnel and property.
3. Take all necessary precautions for temporary fire protection during welding and cutting.

a. Carefully mask or shield adjacent surfaces to prevent damage from heat or welding materials. Take particular care to prevent fires.

C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

D. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent interruption to occupied areas.

3.3 PERFORMANCE

A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
3. Concrete: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
4. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting. If a valve is used, provide access to the valve.
5. Proceed with patching after construction operations requiring cutting are complete.

C. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.

    a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
    b. Restore damaged pipe covering to its original condition.

3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.

    a. Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.

4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
5. Roofing / Exterior Building Enclosure: Patch components using material to match existing and in a manner that restores enclosure to a weathertight condition.

D. Cleaning: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.

END OF SECTION

SECTION 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL (NOT USED)

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 DISPOSAL OF WASTE

A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to Authorities Having Jurisdiction.

1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Waste and debris removed from the worksite and not specified for reuse becomes the responsibility of the Contractor and disposed of off park property in areas authorized by the applicable county and/or state agencies and in accordance with current rules and regulations governing the disposal of solid waste. Disposal fees and sundry charges are paid by the Contractor and are incidental to the contract.

C. Burning: Do not burn waste materials.

D. Disposal: Remove waste materials from Owner's property and legally dispose of them.

END OF SECTION

SECTION 017700 – CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 OPERATING AND MAINTENANCE (O&M) INSTRUCTION MANUAL

A. Final payment will be held to no more than 95 percent completion percentage until receipt of the O & M Instruction Manuals. Payment for Contract closeout item will be made after receipt and approval of the manuals by the Project Representative. Have O & M Instruction Manuals prepared before final payment. Lack of O & M Instruction Manuals will not be a cause for Contract extensions.

B. Furnish two (2) complete hard copy sets of binders and one (1) Electronic PDF copy on a storage device containing the following data for each mechanical, pumping, electrical equipment, major hardware, and plumbing installation or provided on this Project:

1. Installation instructions
2. Operating instructions (start-up and shut-down)
3. Maintenance instructions, including trouble shooting guide
4. Electrical schematics
5. Illustrated parts breakdown and code (if available)
6. Parts list (complete)
7. Technical manuals
8. Provide a complete list of manufacturer's representatives sales offices, or suppliers of major parts used on this Project, including their business address and telephone number, for the Park Manager's use when maintaining/repairing the system. Major parts are defined as other than miscellaneous plumbing, wire, piping fittings, etc.
9. List of subcontractors contact information, and specific items of work performed by them.
10. Tab binders and clearly mark all information contained.

C. Affix to walls, panels, boxes or at other locations, the following data sealed in heavy plastic:

1. Operating instructions (start-up and shut-down)
2. Electrical schematics

D. Operating instructions refer to designated parts of each particular installation as necessary and tag such parts with permanent markers as directed by Project Representative. This includes operational equipment.

1.2 AS-BUILTS

A. Before final acceptance of Project, furnish Project Representative "As-Builts" which shows as-built locations and dimensions of major items constructed. Include locations and elevations of existing utilities encountered during excavation. Show location of pipes, manholes, buildings, structures, etc. by field measurements consisting of at least two (2) ties to permanent surface objects such as hydrants, buildings, etc.

B. Final payment: No more than 95 percent until As-Built Drawings received. Payment made after receipt and acceptance of drawings by Project Representative. Lack of As-Built Drawings will not be a cause for contract extensions.

1.3 SPECIAL TOOLS

A. Deliver special tools required for maintenance and adjustment of equipment to Project Representative upon completion and before final acceptance of Project.

1.4 SPARE MATERIALS AND PARTS

A. Before final acceptance, deliver spare materials, parts and other similar items to storage locations specified by Project Representative.

1.5 CERTIFICATES AND PERMITS

A. Submit signed original certificates of compliance and final approval from Authorities Having Jurisdiction.

1.6 OUTSTANDING DOCUMENTS

A. Expedite and submit outstanding administrative documents including outstanding cost proposals, Change Orders, etc.

1.7 PRIOR OCCUPANCY

A. Reference General Conditions.

B. Commission has the right to occupy completed portions of Project prior to final acceptance, and such occupation is not an acceptance of Project. Prior to occupancy, Project Representative and Contractor mutually agree to a date for prior occupancy; the area to be occupied; that occupancy is commencing within the requirements of applicable codes and ordinances; that endorsements from insurance companies, as necessary to maintain full insurance of Project regardless of prior occupancy, have been obtained; and that other necessary provisions are completed.

C. The Project Representative will inspect areas designated for prior occupancy and issue a letter of acceptance or provide a list of deficiencies to be corrected to Contractor. Correct deficiencies prior to date of occupancy.

1.8 SUBSTANTIAL COMPLETION

A. Reference General Conditions.

B. Notify Project Representative in writing a minimum of seven (7) days in advance of the scheduled date of completion. Project Representative will conduct a "pre-final" inspection and formulate a final punchlist of Work items to be completed prior to final inspection. Project

Representative will establish the date of substantial completion based on pre-final inspection findings. Following this inspection, Project Representative will either issue notice of substantial completion or advise the Contractor of deficient items which must be corrected prior to issuance of substantial completion.

1.9 DAMAGE TO FACILITIES, ROADS, VEGETATION OR PROPERTY

A. During the course of construction, should any park facility be damaged by the Contractor's actions, operations or neglect, repair any such damages to their original condition, as acceptable to the Project Representative, at no cost to the Commission.

B. Repair, restore or replace any park roads, vegetation or property damaged by the Contractor to the original condition at the time construction began. Repair or replace trees and vegetation indicated to remain, which has been damaged by construction operations, in a manner acceptable to the Project Representative.

1.10 FINAL CLEAN-UP

A. Upon completion of the Work and prior to final inspection and acceptance, clean up the entire construction site and all grounds occupied by the Contractor in connection with the Work.

B. Fine graded, rake clean and smooth all worksites and disturbed areas. Remove from the park rubbish, surplus and discarded materials, falsework, temporary structures, equipment, and debris.

C. Leave all phases of the Project clean and ready for public use prior to final acceptance.

D. Inspect all materials and surfaces for damage, scratches, marring, untreated ends of sawcuts, etc. and repair to original or intended condition.

1.11 FINAL INSPECTION AND ACCEPTANCE

A. Reference General Conditions.

B. Notify Project Representative in writing when Work, including punchlist items, has been completed.

C. Project Representative will schedule and conduct a final inspection to verify that outstanding Work items are complete.

D. Owner will establish the date of final acceptance based on the results of final inspection. Complete/correct any items identified as outstanding during final inspection prior to final acceptance of Project.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 022614 - ADDITIONAL DOCUMENTS

PART 1 - GENERAL

1.1 SUBSURFACE INVESTIGATION REPORT

A. The geotechnical report is included with this document, titled: Geotechnical Engineering Report, prepared by Migizi Group.

1. This report identifies properties of below grade conditions and offers recommendations for the design of foundations, prepared primarily for the use of the Architect/Engineer.

2. The recommendations described shall be construed as a requirement of this contract.

3. This report, by its nature, cannot reveal all conditions that exist on the site. Should subsurface conditions be found to vary substantially from this report, changes in the design and construction of foundations will be made, with resulting credits or expenditures to the Contract Price/Sum accruing to the Owner.

1.2 TOPOGRAPHIC SURVEY

A. A copy of topographic survey is included with the drawings, titled: Site Survey, sheet SV001, prepared by Engineering, Washington State Parks.

1. This survey identifies grade elevations and property lines prepared primarily for the use of the Architect/Engineer in establishing new grades and locating structures.

1.3 ORIGINAL DOCUMENTS

A. Original 1909 C. M. & P. S. Ry. Co. Design drawings for a Lombard Type Depot are available upon request, for general reference.

1. Building Design does vary from original proposal drawings and must be field verified for accuracy.

***END OF SECTION**

SECTION 024100 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 SUBMITTALS

A. Submit under provisions of Section 01 33 00.

B. Shop Drawings: Indicate demolition and removal sequence and location of salvageable items, location and construction of barricades, fences and temporary work.

1.2 PROJECT RECORD DOCUMENTS

A. Submit under provisions of Section 01 77 00.

B. Accurately record actual locations of capped utilities and subsurface obstructions.

1.3 REGULATORY REQUIREMENTS

A. Conform to applicable codes for demolition work and disposal of debris.

B. Obtain required permits from authorities.

C. Notify affected utility companies before starting work and comply with their requirements.

D. Conform to applicable regulatory procedures when discovering hazardous or contaminated materials.

1.4 SEQUENCING

A. Sequence activities to demolish the Work in the following order:

1. Remove non- historic materials to ascertain conditions of materials to be reused or salvaged.

2. Salvage and catalog items to be reused on site.

3. Salvage materials to be turned over to owner.

1.5 SCHEDULING

A. Schedule Work under the provisions of Section 01 32 16.

B. Schedule Work to coincide with new construction and remodel work.

C. Describe demolition removal procedures and schedule.

D. Coordinate Work with relocation of utilities and other items noted.

E. Coordinate disruption of Building Utility, Fire or Life safety systems with Owner ten (10) days prior to disruption

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

3.1 **PREPARATION**

A. Provide, erect, and maintain temporary barriers and security devices at locations indicated.

B. Protect existing landscaping materials and structures that are not to be demolished.

C. Prevent movement or settlement of adjacent structures. Provide bracing and shoring.

D. Construct and maintain weatherproof closures for existing openings. Protect existing roofing and insulation from water where demolition work exposes material to the weather, route water away from openings.

E. Protect existing material, structure, and finishes that are not to be demolished.

F. Disconnect, remove, and cap utility lines within demolition areas. Protect and maintain utilities required to serve occupied portions of building.

G. Mark location of utilities and protect from disconnection and/or damage.

3.2 **DEMOLITION REQUIREMENTS**

A. The general scope of demolition work shall include:

1. Demolition and removal of all items required to accommodate new work.

2. Relocation of piping, conduit, wiring, cabling and other items noted, including temporary utility shut down and re-connection. Core drill through foundation walls for conduit and piping.

B. Cease operations immediately if adjacent structures appear to be in danger. Notify Project Representative. Do not resume operations until directed.

C. Obtain written permission from adjacent property owners when demolition equipment will traverse, infringe upon, or limit access to their property.

3.3 **DEMOLITION**

A. Disconnect, remove, and cap utilities within demolition areas.

B. Demolish in an orderly and careful fashion. Protect existing supporting structural members, and existing building components, finishes, materials, equipment, furniture, etc., not to be demolished.

C. Except where noted otherwise, remove demolished materials from site. Deposit material at approved dumping sites. Do not bury or burn material on site.

D. Demolition of existing work/items shall include removal of all connections and fasteners, foundations, soffits, facework, etc., associated with the work or item to be demolished.

E. Sawcut all edges of concrete or asphalt pavements to be removed. Sawcut openings in concrete or masonry wall for doors or windows.

F. Do not modify or cut any structural member, wall, or condition unless specifically detailed on structural drawings or approved by structural engineer in writing.

G. Remove materials to be reinstalled or retained in manner to prevent damage. Store and protect in accordance with requirements of Section 01 60 00.

H. Backfill areas excavated as a result of demolition.

I. Rough grade and compact areas affected by demolition to maintain site grades and contours.

J. Leave site in clean condition.

K. Remove temporary work.

3.4 RELOCATION

A. Coordinate new locations of items noted with Owner’s representatives.

3.5 SCHEDULES

A. Relics, antiques, and similar objects remain the property of Owner. Obtain direction regarding method of removal.

B. Items to be removed, stored, and protected for reinstallation, if moved or relocated.:

1. Fir Wood flooring
2. Wood Paneling, Beadboard walls and ceilings.
3. Wood Paneling, Rough sawn Ship lap paneling in freight room.
4. Cabinet work in Ticket Office and Freight room..
5. Wood Doors and Frames, if reused.

C. Items to be removed and be retained by Owner; deliver to location designated by Owner:

1. Maple flooring

2. Wood Doors, Frames, and windows.

D. Items to be protected:

1. Historic wood Finishes
2. Historic Windows and Doors.
3. Casework

END OF SECTION

SECTION 031100 - CONCRETE FORMING

PART 1 - GENERAL

1.1 **REFERENCES**

A. ACI 301 - Structural Concrete for Buildings.

B. ACI 318 - Building Code Requirements for Reinforced Concrete.

C. ACI 347 - Recommended Practice For Concrete Formwork.

D. PS 1 - Construction and Industrial Plywood.

1.2 **DESIGN REQUIREMENTS**

A. Design, engineer and construct formwork, shoring, and bracing to conform to design and code requirements; resultant concrete to conform to required shape, line and dimension.

1.3 **QUALITY ASSURANCE**

A. Perform Work in accordance with ACI 347.

B. Design formwork under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State of Washington.

1.4 **REGULATORY REQUIREMENTS**

A. Conform to International Building Code and Local Building Department requirements for design, fabrication, erection, and removal of formwork.

1.5 **DELIVERY, STORAGE, AND PROTECTION**

A. Section 01 60 00 – Product Requirements: Transport, handle, store, and protect products.

B. Deliver void forms and installation instructions in manufacturer's packaging.

C. Store off ground in ventilated and protected manner to prevent deterioration from moisture.

PART 2 - PRODUCTS

2.1 **WOOD FORM MATERIALS**

A. Conform to ACI 347.

B. Form Panels: For concrete exposed to view use HDO plywood with high-density phenolic overlay, Simpson Timber Company "Multipour HDO". Form panels for all other concrete shall be B-B Grade form plywood.

2.2 FORMWORK ACCESSORIES

A. Form Ties: Provide snap-off metal form ties, designed to prevent form deflection, and to prevent spalling concrete surfaces upon removal. The portion of tie remaining within concrete after removal of exterior parts shall be recessed 3/4 inch from the outer concrete surface and will not leave a hole larger than 1 inch diameter in the concrete surface. Form ties shall be manufactured items with stress value published.

B. Form Release Agent: Colorless mineral oil that will not stain concrete or absorb moisture, or form release agent compatible with form liner materials.

2.3 STAMPED CONCRETE FINISH

A. Refer to Section 03 35 60 for Stamped Colored Concrete finish.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify lines, levels, and centers before proceeding with formwork. Ensure that dimensions agree with drawings and align with adjacent existing construction.

3.2 EARTH FORMS

A. Hand trim sides and bottom of earth forms. Remove loose soil prior to placing concrete.

3.3 ERECTION - FORMWORK

A. Erect formwork, shoring, and bracing to achieve design requirements in accordance with requirements of ACI 301.

B. Provide bracing to ensure stability of formwork. Shore or strengthen formwork subject to overstressing by construction loads.

C. Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping. Permit removal of remaining principal shores.

D. Align joints and make watertight. Keep form joints to a minimum.

E. Obtain approval before framing openings in structural members that are not indicated on drawings.

F. Provide 3/4 inch chamfer at all external corners.

G. Coordinate this Section with other sections of work that require attachment of components to formwork.

H. If formwork is placed after reinforcement resulting in insufficient concrete cover over reinforcement before proceeding, request instructions from Architect / Engineer.

3.4 APPLICATION - FORM RELEASE AGENT

A. Apply form release agent on formwork in accordance with manufacturer's recommendations.

B. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.

C. Do not apply form release agent where concrete surfaces will receive special finishes or applied coverings that are affected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces coated prior to placement of concrete.

3.5 INSERTS, EMBEDDED PARTS, AND OPENINGS

A. Provide formed openings where required for items to be embedded in passing through concrete work.

B. Locate and set in place items that will be cast directly into concrete.

C. Coordinate with work of other sections in forming and placing openings, slots, reglets, recesses, sleeves, bolts, anchors, other inserts, and components of other Work.

D. Install accessories in accordance with manufacturer's instructions, straight, level, and plumb. Ensure items are not disturbed during concrete placement.

E. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain.

F. Close temporary openings with tight fitting panels, flush with inside face of forms, and neatly fitted so joints will not be apparent in exposed concrete surfaces.

3.6 FORM CLEANING

A. Clean forms as erection proceeds, to remove foreign matter within forms.

B. Clean formed cavities of debris prior to placing concrete.

C. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.

D. During cold weather, remove ice and snow from within forms. Do not use de-icing salts. Do not use water to clean out forms, unless formwork and concrete construction proceed within heated enclosure. Use compressed air or other means to remove foreign matter.

3.7 FORMWORK TOLERANCES

A. Construct formwork to maintain tolerances required by ACI 301.

3.8 FIELD QUALITY CONTROL

A. Section 01 45 00 - Quality Control: Field inspection and testing.

B. Inspect erected formwork, shoring, and bracing to ensure that work is in accordance with formwork design, and that supports, fastenings, wedges, ties, and items are secure.

3.9 FORM REMOVAL

A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads.

B. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.

C. Store removed forms in manner that surfaces to be in contact with fresh concrete will not be damaged. Discard damaged forms.

END OF SECTION

SECTION 032000 - CONCRETE REINFORCING

PART 1 – GENERAL

1.1 **REFERENCES**

A. ACI 301 - Structural Concrete for Buildings.

B. ACI 315 – Details and Detailing of Concrete Reinforcement.

C. ACI 318 - Building Code Requirements for Structural Concrete.

D. ACI SP-66 - American Concrete Institute - Detailing Manual.

E. ASTM A82 - Cold Drawn Steel Wire for Concrete Reinforcement.

F. ASTM A185 - Welded Steel Wire Fabric for Concrete Reinforcement.

G. AWS D1.4 - Structural Welding Code for Reinforcing Steel.

H. AWS D12.1 - Welding Reinforcement Steel, Metal Inserts and Connections in Reinforced Concrete Construction.

I. CRSI - Concrete Reinforcing Steel Institute - Manual of Practice.

J. CRSI 63 - Recommended Practice For Placing Reinforcing Bars.

K. CRSI 65 - Recommended Practice For Placing Bar Supports, Specifications and Nomenclature.

L. IBC – International Building Code.

1.2 **SUBMITTALS**

A. Submit under requirements of Section 01 33 00 Submittal- Procedures.

B. Shop Drawings: Indicate bar sizes, spacing, locations, and quantities of reinforcing steel and wire fabric, bending and cutting schedules, supporting and spacing devices and other arrangements and assemblies as required for fabrication and placement of reinforcement for all cast-in-place concrete work.

1.3 **QUALITY ASSURANCE**

A. Codes and Standards: Comply with provisions of references listed in Paragraph 1.1 (above), except where more stringent requirements are shown or specified. Refer also to Structural General Notes on Structural Drawings.

1.4 REGULATORY REQUIREMENTS

A. Conform to International Building Code and Local Building Department requirements for testing, inspection, etc. during construction.

PART 2 - PRODUCTS

2.1 REINFORCEMENT

A. All concrete reinforcement materials shall be new and free from rust, and shall comply with the following reference standards:

1. Bars for reinforcement shall comply with the requirements of "Specifications for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement," ASTM Designation A615, Grade 60, unless noted otherwise.

    a) Galvanized bars shall conform to ASTM A787**.**

2. Wire for reinforcement shall comply with the requirements of "Specifications for Steel Wire, Plain, for Concrete Reinforcement," ASTM Designation A82.

3. Wire fabric shall comply with the requirements of "Specifications for Steel Welded Wire, Fabric, Plain, for Concrete Reinforcement," ASTM Designation A185.

2.2 ACCESSORIES

A. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for strength and support of reinforcement during concrete placement conditions including load bearing pad on bottom to prevent vapor barrier puncture.

B. Special Chairs, Bolsters, Bar Supports, Spacers Adjacent to Weather Exposed Concrete Surfaces: Plastic coated steel type; size, and shape as required.

2.3 FABRICATION

A. Fabricate concrete reinforcing in accordance with CRSI Manual of Practice.

B. Detail and fabricate in accordance to ACI 315 and ACI 318.

C. Fabrication: Conform with CRSI. Provide all bars in longest lengths available or required; conform to sizes, shapes, and dimensions shown on Structural Drawings.

PART 3 – EXECUTION

3.1 PLACEMENT (REINFORCING STEEL)

A. Place in accordance with CRSI. Place, support and secure reinforcement against

displacement. Do not deviate from required position.

B. Place in accordance to ACI 315 and ACI 318.

C. Galvanized bars should be handled carefully, avoiding damage to the coating, in the event that the coating incurs damage, field repairs may be done with a cold applied zinc galvanizing paint having a minimum of 65% zinc dust in the dry film.

D. Accommodate placement of formed openings.

E. Unless shown otherwise, maintain minimum 3/4-inch space between all formwork and reinforcement, tie wires, etc.

F. Provide concrete cover over reinforcement as follows; unless noted otherwise:

1.	Concrete cast against Earth:	3 inches.
2.	Concrete exposed to Weather or Earth:	2 inches.
3.	Ties on Beams and Columns:	1-1/2 inches.
4.	Walls and Slabs not exposed to Weather:	3/4 inch.

END OF SECTION

SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 REFERENCES

A. ACI 117 – Tolerances for Concrete Construction and Materials

B. ACI 301 – Structural Concrete for Buildings.

C. ACI 302 – Guide for Concrete Floor and Slab Construction.

D. ACI 303R – Guide to Cast-In-Place Architectural Concrete Practice.

E. ACI 304 – Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete.

F. ACI 305R – Hot Weather Concreting.

G. ACI 306R – Cold Weather Concreting.

H. ACI 308 – Standard Practice for Curing Concrete.

I. ACI 315 – Details and Detailing of Concrete Reinforcement.

J. ACI 318 – Building Code Requirements for Structural Concrete.

K. ASTM E 1643 – Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs

L. ASTM E 1745 – Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs

M. IBC – International Building Code.

1.2 REGULATORY REQUIREMENTS

A. Conform to International Building Code and local Building Department requirements for testing, inspection, etc. during construction.

1.3 TESTS

A. Provide copy of concrete mix design submittal for each class of concrete to Testing Lab ten (10) days prior to commencement of work.

1.4 SUBGRADE APPROVAL

A. Subgrade Approval: Do not proceed with on-grade concrete placement over any subgrade condition until the Soils Engineer and testing lab have approved existing subgrade, structural backfill, and utility trench backfill.

B. Coordination: Contractor shall contact and schedule review of subgrade with Soils Engineer and testing laboratory ten (10) days (minimum) prior to any on-grade concrete placement.

1.5 SUBMITTALS FOR REVIEW

A. Submit under the requirements of Section 01 33 00 - Submittal Procedures.

B. Product Data: Provide data on joint devices, attachment accessories, admixtures and finishes products.

1.6 QUALITY ASSURANCE

A. Codes and Standards: Comply with provisions of references listed in Paragraph 1.1 (above), except where more stringent requirements are shown or specified. Refer also to Structural General Notes on Structural Drawings.

B. Concrete and Formwork: Performed by company experienced for five (5) years (minimum) in construction of top quality, site cast concrete work, familiar with and capable of producing concrete work in accordance with referenced standards listed in Paragraph 1.01 (above) and these specifications and drawings.

C. Architectural Concrete: Perform Work in accordance with ACI 301 and ACI 303R.

1.7 COLORS

A. Natural, unless noted otherwise.

PART 2 - PRODUCTS

2.1 CONCRETE MATERIALS AND MIX

A. General:

1. All concrete, unless otherwise specifically permitted by the Engineer, shall be batched and mixed at the same approved plant.

2. The control of concrete production shall be under supervision of a recognized testing laboratory, selected and paid for by the Owner, which shall design the mixes and furnish inspection of batched aggregates at the mixing plant.

B. Quality:

1. Concrete of the tabulated classes shall have the following minimum compressive strengths at twenty-eight (28) days. Concrete shall be proportioned within the following limits unless approved otherwise after submittal of a mix design.

Class	Minimum of psi @ 28 days	Minimum Sacks of Cement/C.Y.**	Maximum Slump
E	3000	6	3-1/2"

** Mixes utilizing less cement content may be approved upon submittal of compression test reports.

The minimum compressive strengths tabulated are the strength at twenty-eight (28) days for ordinary concrete, or the strength at seven (7) days for high-early strength concrete. For plant-mix concrete, a certificate showing proportions and the seven (7) day strength of the concrete mix being furnished shall be obtained from the supplier and furnished to the Engineer.

2. Concrete made with coarse aggregate of less than Washington State Department of Transportation standard "Grading No. 5" as described in Paragraph 9-01.1(3)C, shall have an extra one-half (1/2) sack of cement added to the minimum indicated in the table above.

3. All classes of concrete may contain an appropriate amount of Fly Ash as a pozzolanic material. Concrete mix designs, including Fly Ash, shall be prepared by a certified laboratory and have the approval of the Engineer prior to use.

C. Cement:

1. All cement shall be Portland cement conforming to ASTM Designation C150, Type I or Type III, and shall be the product of one (1) manufacturer.

2. Type III cement shall be used for all concrete unless the use of Type I cement is specifically authorized in writing by the Engineer. The use of Type I cement will be authorized only if the Contractor can demonstrate, by preparation of and adherence to a construction schedule approved by the Engineer, that the project will be completed within the stipulated contract time using the Type I cement.

D. Aggregates:

1. Aggregates for standard Portland cement concrete shall conform to the quality requirements of the State of Washington Standard Specifications for Road, Bridge, and Municipal Construction.

E. Water: Water used for mixing concrete shall conform to the quality requirements of Paragraph 9-25.1 of the Washington State Standards.

2.2 CONCRETE REINFORCING

A. Concrete Reinforcing: Refer to Section 03 20 00 Concrete Reinforcing.

2.3 ADMIXTURES

A. Admixtures: Only upon Structural Engineer's approval.

B. Air Entertainment Admixture: ASTM C260 at all exterior concrete.

2.4 FORMLINER FOR VERTICAL SURFACES:

A. Basis of Design: Fitzgerald Formliner No. 16926LP, 5" Wood Plank, medium to light grain, V grove.

1. Location: Recessed panel in cast in place foundation walls.

B. Rough Sawn Wood form boards, Formliner or real wood forms acceptable.

1. Location: Former foundation post locations, cast in place foundation walls.

2.5 ACCESSORIES

A. Bonding Agent: 100% acrylic emulsion; manufactured by the Burke Company or approved. Use for all plug or patch work on cured concrete to increase bond strength.

B. Non-Shrink Grout (Non-Structural): Premixed compound consisting of non-metallic aggregate, cement, water reducing, and plasticizing agents, capable of 4500 PSI at seven (7) days.

C. Non-Shrink Grout (Structural): See Structural General Notes on Structural Drawings.

2.6 JOINT DEVICES AND FILLER MATERIALS

A. Joints: Refer to Structural General Notes and Details on Structural Drawings.

B. Joint Filler: ASTM D994; asphalt impregnated fiberboard or felt, 1/4 inch thick; full depth of slab.

2.7 CURING MATERIALS

A. Water: Clean and drinkable.

B. Curing Membrane: White 4 mil polyethylene film or a combination sheet plastic and paper, 20 ft minimum roll width.

C. Concrete Curing Compound: A transparent curing, sealing, and dust proofing compound for interior and exterior concrete.

1. No oils, saponifiable resins waxes or chlorinated rubbers.

2. Coordinate work with 07 92 00 – Joint Sealants.

3. Apply to concrete as recommended by manufacturer's product data. Verify compatibility with flooring adhesives where floor covering is scheduled.

D. Absorptive Mat: Burlap-polyethylene minimum 8 oz./sq yd., bonded to prevent separation during use.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify requirements for concrete cover over reinforcement.

B. Verify that anchors, seats, plates, reinforcement, and other items to be cast into concrete are accurately placed, positioned securely, and will not cause hardship in placing concrete.

3.2 PREPARATION

A. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent in accordance with manufacturer's instructions.

B. In locations where new concrete is dowelled to existing work, drill holes in existing concrete, insert steel dowels, and pack solid with non-shrink grout.

C. Coordinate the placement of joint devices with erection of concrete formwork and placement of form accessories.

D. Vapor Retarder: Place vapor retarder in accordance with manufacturer’s recommendations and ASTM E 1643. Ensure all penetrations and seams are sealed and defects repaired.

E. Responsibility: Contractor is responsible for correcting at his own expense, any moisture related floor-coating failures due to improper installation and protection of vapor barrier.

F. Embedded Items:

1. No aluminum items shall be embedded in any concrete.

2. All embed plates shall be securely fastened in place.

3. All embedded steel items exposed to earth shall be galvanized.

4. Embedded conduit in not permitted in concrete slabs on metal deck unless specifically noted on the structural drawings.

3.3 NOTIFICATION PRIOR TO PLACING CONCRETE

A. Notify Project Representative minimum twenty-four (24) hours prior to commencement of concreting operations.

B. Notify Owner's testing lab prior to concrete placement and coordinate their field inspections.

C. Notify Building Department in accordance with their requirements prior to concrete placement.

3.4 PLACING CONCRETE

A. Place concrete in conformance with ACI 304. Conform to ACI 305R for hot weather concreting and ACI 306R for cold weather concreting. Conform to ACI 303R for Architectural concreting.

B. Notify Project Representative minimum twenty-four (24) hours prior to commencement of operations.

C. Ensure reinforcement, inserts, embedded parts, formed expansion and contraction joints, are not distributed during concrete placement.

D. Install vapor barrier under interior slabs on grade. Lap joints minimum 6 inch and seal watertight by taping edges and ends.

E. Repair vapor barrier damaged during placement of concrete reinforcing. Repair with vapor retarder material; lap over damaged areas minimum 6 inch and seal watertight.

F. Separate slabs on grade from vertical surfaces with thick joint filler.

G. Place joint filler in pattern placement sequence. Set top to required elevations. Secure to resist movement by wet concrete.

H. Extend joint filler from bottom of slab to within 1/8 inch of finished slab surface.

I. Install joint devices in accordance with manufacturer's instructions.

J. Install construction joint devices in coordination with pattern placement sequence. Set top to required elevations. Secure to resist movement by wet concrete.

K. Install joint device anchors. Maintain correct position to allow joint cover to be flush with floor and wall finish.

L. Install joint covers in longest practical length, when adjacent construction activity is complete.

M. Place concrete continuously between predetermined expansion, control, and construction joints.

N. Do not interrupt successive placement; do not permit cold joints to occur.

O. Place floor slabs in pattern indicated.

P. Saw cut joints within twenty-four (24) hours after placing. Use 3/16 inch thick blade, cut into 1/4 depth of slab thickness.

3.5 CONCRETE FINISHING

A. Finish concrete floor surfaces in accordance with ACI 301.

B. Steel trowel surfaces with light sand finish that are scheduled to be exposed. Stamped and stained concrete finishes as noted on drawings or form liner cast in place finishes as noted on drawings.

C. Maintain floor elevation at walls; pitch surfaces uniformly to drain water out of structure with no ponding.

D. Cast in place formliner and rough sawn finish.

3.6 TOLERANCES

A. Slab surfaces shall be finished to meet a floor surface requirements for slope and cross slope per Accessibility guidelines per IBC requirements.

B. Finished Floor Slab: Surfaces that do not meet the required tolerance shall be corrected by localized grinding of high spots or by a concrete topping / cementitious underlayment to fill low areas.

3.7 CURING AND PROTECTION

A. Cure floor surfaces in accordance with ACI 308.

B. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.

C. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.

D. Spraying: Spray water over floor slab areas and maintain wet for seven (7) days.

3.8 PATCHING

A. Allow Engineer to inspect concrete surfaces immediately upon removal of forms.

B. Excessive honeycomb or embedded debris in concrete is not acceptable. Notify Engineer upon discovery.

C. Patch imperfections in accordance with ACI 301 and ACI 303R.

3.9 DEFECTIVE CONCRETE

A. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.

B. Repair or replacement of defective concrete will be determined by the Project Representative.

C. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Project Representative for each individual area.

3.10 PROTECTION

A. Protect all concrete from mechanical damage or contamination by any substance which would adversely affect the strength, integrity, appearance, usefulness or successful performance of coatings, finishes, or floor coverings applied to the concrete.

B. Contractor is solely responsible for the means and methods employed to afford this protection.

END OF SECTION

SECTION 033560 - STAMPED CONCRETE FINISHES

PART 1 – GENERAL

1.1 **REFERENCES**

A. ACI 301 – Structural Concrete for Buildings.

B. ACI 302 – Guide for Concrete Floor and Slab Construction.

C. ACI 303 - Guide to Cast-in-Place Architectural Concrete Practice.

D. ACI 305R - Hot Weather Concreting.

E. ACI 306R - Cold Weather Concreting.

F. ACI 308 - Standard Practice for Curing Concrete.

G. ACI 309 - Standard Practice for Consolidation of Concrete.

H. ACI 347 - Guide to Formwork for Concrete.

I. WASTM C979 - Standard Specification for Pigments for Integrally Colored Concrete.
.

1.2 **SUBMITTALS**

A. Submit under provisions of Section 01 33 00.

B. Product Data: Provide data on sealer and slip resistant treatment, compatibilities, and limitations.

1.3 **MAINTENANCE DATA**

A. Submit under provisions of Section 01 77 00.

B. Maintenance Data: Provide data on maintenance renewal of applied coatings.

1.4 **QUALITY ASSURANCE**

A. Perform work in accordance with ACI 301 and ACI 302.

B. Maintain one (1) copy of documents on site.

C. Installer Qualifications: Installer to have a minimum of five year experience in colored & stamped concrete finishes

1.5 MOCKUP

A. Provide mockup of floor finish under provisions of Section 01 40 00.

B. Provide 4 ft x 4 ft stamped and colored concrete mock up for approval prior to the start of installation. Mock up to remain on site until the end of the project for comparison with installed work. Mock up is to be removed by General Contractor at Owners request.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect, and handle products to site under provisions of Section 01 60 00.

B. Deliver materials in manufacturer's packaging including application instructions.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Ambient temperature of 50 degrees F minimum.

B. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer.

1.8 COORDINATION

A. Coordinate work under provisions General Conditions.

B. Coordinate the work with concrete floor placement and concrete floor curing.

1.9 ALTERNATES

A. See Section 01 23 00 for bidding alternates affecting work in this section.

1.10 COLORS

A. Colors are specified on the Colors and Materials Schedule on the drawings.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Concrete Stamp:

1. The Bomanite Company, Imprint Systems
2. Butterfield Color
3. Sika Corporation

B. Concrete Color:

1. The Bomanite Company

2. L.M. Scofield

3. Butterfield Color

C. Substitutions under provisions of Section 01 60 00.

2.2 SLIP RESISTANT TREATMENT

A. Slip Resistant Finish: Silica sand type, color at exterior platform as selected from manufacturer's standard range; manufactured by Davis Colors or approved.

2.3 COLORED CONCRETE

A. Concrete Color/Hardener: Shake-on type, Lithochrome color/hardener as manufactured by L.M. Scofield Company from their range of standard colors. Manufacturer shall provide color samples for review prior to installation. Coordinate concrete mix design and placement with dry shake color hardener manufacturer's requirements. Provide curing and sealing materials approved by the color hardener manufacturer.

2.4 STAMPED CONCRETE FINISH

A. Pattern : 12" Wood Plank stamp,

1. Basis of Design: Butterfield Color: BST7596 & BST7398

PART 3 – EXECUTION

3.1 EXAMINATION

A. Verify site conditions under provisions of General Conditions.

B. Verify that surfaces are acceptable to receive the work of this Section.

3.2 FLOOR FINISHING

A. Place Concrete in accordance with ACI 301, ACI 302 and ACI 304.. Place concrete continuously between predetermined construction joints. Do not break or interrupt successive pours such that cold joints occur.

B. After consolidating and screeding, float concrete to gradients indicated. Use a straight edge to level and test surface in longitudinal direction to required grade. Finish edges to provide a smooth dense surface with 1/8 inch radius.

C. Apply Color Hardener prior to application of pattern. Apply at rate recommended by manufacturer, evenly to the surface of the fresh concrete by the dry-shake method. Applied in two or more shakes, floated after each shake and troweled only after the final floating.

D. While concrete is still in its plastic state, apply the tool/texture pattern to the surface of the concrete. Properly tamp tools into the surface to achieve the required texture, with uniformity of pattern and depth of stamping. Utilize bond breaker to keep tools from sticking to fresh concrete.

1. Release material shall be applied to the troweled surface prior to imprinting.

E. Place curing compound on exposed concrete surfaces immediately after finishing. Apply in accordance with manufacturer's instructions.

F. Apply secondary stain treatment per approved mock-up or as scheduled to achieve design.

G. Apply finish sealer per approved mock-up or as specified to achieve design required.

3.3 SURFACE TREATMENT

A. Apply slip resistant finish in accordance with manufacturer’s instructions on floor surfaces.

B. Apply sealer in accordance with manufacturer’s instructions on floor surfaces.

3.4 PROTECTION

A. Immediately after placement, protect concrete from premature drying, excessive hot or cold temperatures, and mechanical injury.

END OF SECTION

SECTION 034500 - PRECAST ARCHITECTURAL CONCRETE

PART 1 - GENERAL

1.1 REFERENCES

A. ASTM C33 – Concrete Aggregates.

B. ASTM C150 – Portland Cement.

C. ASTM C260 – Air-Entraining Admixtures for Concrete.

D. PCI MNL-117 – Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products.

E. PCI MNL-122 – Architectural Precast Concrete.

1.2 SUBMITTALS FOR REVIEW

A. Submit under provisions of Section 01 33 00 Submittal- Procedures.

B. Samples: Submit two (2) samples illustrating surface finish, color, and texture.

C. Shop Drawings: Indicate profiles, sizes, anchorage.

1.3 QUALITY ASSURANCE

A. Perform work in accordance with PCI MNL-117 and PCI MNL-122.

B. Fabricator: Company specializing in performing the work of this Section with minimum five (5) years documented experience.

1.4 DELIVERY, STORAGE, AND PROTECTION

A. Section 01 60 00 – Product Requirements: Transport, handle, store, and protect products.

B. Protect units to prevent staining, chipping, or spalling of concrete.

1.5 COLORS

A. Colors are specified on the Colors and Materials Schedule on drawings.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cement: ASTM C150 Type IA – Air Entraining, Portland type.

B. Concrete Materials: ASTM C33, water and sand.

C. Air Entrainment Admixture: ASTM C260.

2.2 MIX

A. Concrete: Minimum 5000 psi, twenty-eight (28) day strength, air entrained to 5 to 7 percent in accordance with ACI 301.

2.3 FABRICATION

A. Fabricate in accordance with PCI MNL-117.

B. Maintain plant records and quality control program during production of precast units. Make records available upon request.

C. Use rigid molds, constructed to maintain precast unit uniform in shape, size, and finish.

D. Cure units to develop concrete quality, and to minimize appearance blemishes such as non-uniformity, staining, or surface cracking.

E. Minor patching in plant is acceptable, providing structural adequacy and appearance of units is not impaired.

2.4 FINISH – PRECAST UNITS

A. Ensure exposed-to-view finish surfaces of precast units are uniform in color and appearance.

2.5 FABRICATION TOLERANCES

A. Maximum Out of Square: 1/8 in. in 10 ft, non-cumulative.

B. Variation From Dimensions Indicated on Drawings: Plus or minus 1/8 in.

C. Maximum Bowing of Units: Length of bow/360.

2.6 SOURCE QUALITY CONTROL AND TESTS

A. Provide testing and analysis of concrete mix.

PART 3 - EXECUTION

3.1 **ERECTION**

A. Erect units without damage to shape or finish. Replace or repair damaged panels.

B. Erect units level and plumb within allowable tolerances.

C. Align and maintain uniform horizontal and vertical joints as erection progresses.

3.2 **ERECTION TOLERANCES**

A. Maximum Variation from Plane of Location: 1/4 in. in 10 ft, non-cumulative.

END OF SECTION

SECTION 040510 - MASONRY MORTARING AND GROUTING

PART 1 - GENERAL

1.1 REFERENCES

A. ASTM C5 - Quicklime for Structural Purposes.

B. ASTM C94 - Ready-Mixed Concrete.

C. ASTM C144 - Aggregate for Masonry Mortar.

D. ASTM C150 - Portland Cement.

E. ASTM C207 - Hydrated Lime for Masonry Purposes.

F. ASTM C270 - Mortar for Unit Masonry.

G. ASTM C387 - Packaged, Dry, Combined Materials for Mortar and Concrete.

H. ASTM C476 - Grout for Reinforced and Non-Reinforced Masonry.

I. The Northwest Masonry Guide (MIW), Bellevue, Washington (206) 453-8820.

J. Structural General Notes on Structural Drawings.

1.2 SUBMITTALS

A. Submit product data under provisions of Section 01 33 00 – Submittal Procedures, for submittals.

B. Include mortar and grout design mix and admixtures.

1.3 ENVIRONMENTAL REQUIREMENTS

A. Conform to recommendations of MIW - Northwest Masonry Guide for Masonry Construction during cold, hot, or wet weather.

1.4 COLORS

A. Match Existing brick mortar color and tooling.

PART 2 - PRODUCTS

2.1 MORTAR AND GROUT MIXES

A. General:

1. Do not add admixtures, including color pigments, air-entraining agents, accelerators, retarders, water repellant agents, anti-freeze compounds, or other admixtures unless otherwise indicated.

2. Do not use calcium chloride in mortar or grout.

B. Mortar for Thin Brick Masonry: Match existing mortar color, strength per Thin Brick manufacturers requirements.

C. Mixing: Combine and thoroughly mix cement, water, and aggregates in a mechanical batch mixer; comply with referenced ASTM standards for mixing time and water content.

PART 3 - EXECUTION

3.1 I**NSTALLATION**

A. Mortar and grout installation per MIW Northwest Mortars Recommended Guide for Masonry Construction.

B. Tool mortar to match existing.

END OF SECTION

SECTION 042113 - THIN BRICK MASONRY VENEER

PART 1 GENERAL

1.1 **REFERENCES**

A. ASTM C 67 - Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile

B. ASTM D 1056 - Standard Specification for Flexible Cellular Materials Sponge or Expanded Rubber

C. ASTM C 1088 - Standard Specification for Thin Veneer Brick Units Made from Clay or Shale.

D. BIA TN 28C - Technical Notes on Brick Construction, Thin Brick Veneer.

E. Masonry Institute of Washington, Masonry Systems (Northwest Edition) Guide.

1.2 **SUBMITTALS**

A. Submit under provisions of Section 01 33 00 – Submittal Procedures.

B. Product Data: Manufacturer's data sheets on each product to be used, including:

1. Preparation instructions and recommendations.

2. Storage and handling requirements and recommendations.

3. Installation methods.

C. Shop Drawings:

1. Submit general placing drawings to indicate unit sizes, layout and bond patterns, spacing, location and quantities of substrate reinforcement and connectors, and structural movement related to thin brick masonry veneer assemblies.

2. Include overall dimensions, framed opening requirements and tolerances, adjacent construction, affected related work, expansion and contraction joint locations, accessories, and project specific details.

D. Selection Samples: For each exposed product to be used, furnish not less than five individual brick samples and as many as required by the brick manufacturer to demonstrate full color range, and texture to be expected in the finished work

E. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

1.3 QUALITY ASSURANCE

A. Sourcing: All primary products specified in this section shall be supplied by a single manufacturer.

B. Manufacturer Qualifications: 10 years' experience manufacturing similar products and with production capability to meet the Project schedule.

C. Installer Qualifications: Minimum 5 years' experience installing similar products.

D. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.

1. Finish areas designated by Project Representative, minimum size 48 inches long by 36 inches high.

2. Do not proceed with remaining work until workmanship and color are approved by Architect.

3. Refinish mock-up area as required to produce acceptable work.

4. Remove panel when directed by the Architect. The approved Panel may be incorporated into the work at the discretion of the Architect.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in the manufacturer's unopened packaging with manufacturer's identification and labels intact until ready for installation.

B. Store in accordance with the manufacturer's instructions and the following:

1. Store units off the ground in a clean, dry, well-ventilated area covered to prevent masonry units and related materials from getting saturated before installation.

2. Protect from surface damage, mud, dust or materials likely to cause staining or other defects.

3. Remove damaged or deteriorated materials from the Project site and replace with new materials to meet specified requirements.

C. Handle materials in accordance with the manufacturer's instructions.

1.5 ENVIRONMENTAL REQUIREMENTS

A. Conform to Masonry Institute of Washington, Masonry Systems Guide and manufacturers recommendations for weather and temperature conditions during construction.

B. Walls to receive thin brick must be structurally sound with a deflection no less than L/240,

plumb and flat within 1/4 inch (6 mm) per 10 feet with corners braced to meet code and design requirements and to alleviate shrinkage, raking, settling, and movement.

1.6 **ALTERNATES**

A. See Section 01 23 00 for bidding alternates affecting work in this section.

1.7 **COLORS**

A. Match existing brick colors and texture.

PART 2 - PRODUCTS

2.1 **MANUFACTURERS**

A. Mutual Materials

B. H. C. Muddox

C. Endicott Clay Products

D. Substitutions: under provisions of Section 01 60 00.

2.2 **THIN BRICK**

A. Thin Brick: ASTM C 1088, Type TBA. Size:

1. Mutual Materials, Craftsmen

a. Size Flats: 1/2 inch T by 2-1/2 inches H by 7-1/3 inches L.

b. Size Corners: 1/2 inch T by 2-1/2 inches H by 7-1/2 inches L and 3-1/2 inches L around corner.

2. Other manufacturer's sizes will be considered based on ability to provide a brick module of 3 inch H by 8 inch L by 4 inch L appearance of depth at openings and outside corners. A uniform mortar height may be reduced to 3/8 inch to accommodate modular compliance.

3. Install products from a single manufacturer.

B. Shapes: Provide flats and corner shapes.

C. Mortar Joint Thickness: 1/2 inch Standard unless otherwise indicated on the Drawings.

D. Mortar Joint shape: Tooled concave unless otherwise indicated on the Drawings.

2.3 **MORTAR**

A. See Section 04 05 10 for mortar associated with work in this section.

B. Mortar shall meet manufacturer's recommendations.

2.4 ACCESSORIES

A. Setting System: Provide setting system complete including manufacturer's accessories including primers, transition and sealing tapes required. System shall Conform to requirements thin brick manufacturer's recommendation:

B. Through Wall Flashing: Stainless Steel

C. Joint Sealants and Backer Rods: as specified in Section 07 92 00

D. Cleaners:

1. Compatible with substrate and acceptable to masonry manufacturer.

2. "New Masonry Cleaner, Type V", as manufactured by Fabrikem or Sure-Klean "Vana Trol" as manufactured by Prosoco, Inc.

PART 3 - EXECUTION

3.1 EXAMINATION

E. Do not begin installation until backup structure and substrates have been properly prepared.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Protect adjacent materials from damage due to masonry work.

C. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for substrate and site conditions.

3.3 INSTALLATION

A. Verify items provided by other Section of work are properly sized and located.

B. Establish lines, levels and coursing. Protect from disturbance.

C. Provide temporary bracing during erection of masonry work. Maintain in place until building provides permanent bracing.

D. Coordinate with Work with installation of water resistive barriers and flashing.

E. Coursing and Bond Patterns:

1. Maintain masonry courses to uniform dimensions. Form vertical and horizontal joints of uniform thickness.

2. Refer to the Drawings for special details and treatments at corners and transitions. Maintain architectural alignments as indicated. Masonry shall appear to be full depth masonry units at all opening and building corners.

3. Lay masonry in full bed of mortar, properly jointed with other work.

4. Do not shift or tap masonry units after mortar has taken initial set. Where adjustments must be made, remove mortar and replace.

5. Remove excess mortar.

6. Preform site cutting with proper tools to provide straight unchipped edges. Take care to prevent breaking masonry unit corners and edges.

F. Mortar Mixing:

1. Mix mortar only in quantities needed for immediate use.

2. Measure materials by volume or equivalent weight, using the same measurement for each material and batch. Do not measure by shovel.

3. Add mortar color in accordance with manufacturer's recommendations. Ensure uniformity of mix and coloration.

4. Clean mixing boards and mechanical mixing machine between batches.

G. Mortar Joint Tooling:

1. Provide slightly concave tool joints when the mortar is thumbprint hard using non-rusting round jointer tools slightly larger than the joint width to smooth and compress mortar tightly against both sides of the joint.

2. Tool joints in a manner to ensure the durability of the building envelope and not retain water or dirt.

3. Head joints shall match bed joint profile.

4. Tool all exterior joints.

5. After tooling, cut off mortar tailings with a trowel and brush mortar burrs and dust from the face of the brick.

3.4 TOLERANCES

A. Variation from Unit to Adjacent Unit: 1/32 inch maximum.

B. Variation from Plane of Wall: 1/4 inch in 10 ft; 1/2 inch in 20 ft or more.

C. Variation from Plumb: 1/4 inch per story non-cumulative.

D. Variation from Level Coursing: 1/8 inch in 3 ft; 1/4 inch in 10 ft.

E. Variation of Joint Thickness: 1/8 inch in 3 ft.

3.5 MASONRY FLASHINGS

A. Extend flashings through veneer, turn up minimum 8 inch and seal backup.

B. Lap end joints minimum 6 inch and seal watertight.

C. Use flashing manufacturer's recommended adhesive.

3.6 CUTTING AND FITTING

A. Coordinate with other Sections of work to provide correct size, shape, and location.

B. Obtain approval prior to cutting or fitting any area not indicated or where appearance or strength of masonry work may be impaired.

3.7 MASONRY CLEANER

A. Clean exposed brick, concrete, and manufactured stone walls.

B. Cleaner: Dilute and apply heavy-duty cleaner in accordance with manufacturer's instruction.

3.8 PROTECTION

A. Protect finished installation.

B. At day's end, cover unfinished walls to prevent moisture infiltration.

END OF SECTION

SECTION 055000 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 REFERENCES

A. ASTM A36 - Structural Steel.

B. ASTM A53 - Hot-Dipped, Zinc-coated Welded and Seamless Steel Pipe.

C. ASTM A123 - Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

D. ASTM A153 - Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

E. ASTM A260 – Chromium and Chromlum – Nickel Stainless Steel plate, sheets and stamped.

F. ASTM A193 – Stainless Steel Bolts

G. ASTM A283 - Carbon Steel Plates, Shapes, and Bars.

H. ASTM A385 - Standard Practice for Providing High Quality Zinc Coatings (Hot Dip)

I. ASTM F593 – Stainless Steel Bolts, Screws & Studs

J. AWS A2.0 - Standard Welding Symbols.

K. AWS D1.1 - Structural Welding Code.

L. SSPC (Steel Structures Painting Council) - Steel Structures Painting Manual.

M. AAMA – American Architectural Manufacturers Association.

1.2 SUBMITTALS

A. Section 01 33 00 – Submittal Procedures, for submittals.

B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.

C. Indicate welded connections using standard AWS A2.0 welding symbols. Indicate net weld lengths.

1.3 QUALITY ASSURANCE

A. Fabricate steel members in accordance with AISC Code of Standard Practice.

B. Perform Work in accordance with AISC Section 10.

C. Fabricator: Company specializing in performing the work of this Section with minimum five (5) years documented experience.

D. Welder(s): Qualified within previous twelve (12) months for type of welding required for this project in accordance with AWS D1.1 and AWS D1.4 and/or WABO (Washington Association of Building Officials) certified as required by local Building Department.

1.4 REGULATORY REQUIREMENTS

A. Welder(s): Qualified within previous twelve (12) months for type of welding required for this project in accordance with AWS D1.1 and AWS D1.4.

1.5 DELIVERY, STORAGE AND PROTECTION

A. Protect products and fabrications under provisions of Section 01 60 00 – Product Requirements.

PART 2 - PRODUCTS

2.1 MATERIALS - STEEL

A. Steel Sections: ASTM A36.

B. Steel Plates: ASTM A283.

C. Steel Pipe: ASTM A53, Grade B, Schedule 40.

D. Steel Bolts, Nuts, Acorn Nuts, Threaded Rods and Washers: Stainless Steel.

E. Welding Materials: AWS D1.1; type required for materials being welded.

2.2 MATERIALS – STAINLESS STEEL

A. Stainless Steel Plate: ASTM A240, type 304.

B. Stainless Steel Squares: ASTM A276, type 304.

C. Stainless Steel Rounds: ASTM A276, type 304.

D. Stainless Steel Angles: ASTM A276, type 304.

E. Stainless Steel Forks, Rods and Components: Grade 304. Refer to structural notes on structural drawings and architectural notes on architectural drawings.

F. Bolts, Nuts, Acorn Nuts, Threaded Rods and Washers: Stainless steel, type 304.

2.3 FABRICATION - MISCELLANEOUS ITEMS

A. Field verify actual dimensions and conditions at site prior to shop fabrication.

B. Fit and shop assemble items in largest practical sections for delivery to site.

C. Fabricate items with joints tightly fitted and secured.

D. Continuously seal joined members by continuous welds. Grind exposed welds smooth.

E. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

F. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.

G. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

H. Eased edges to be smooth, straight and uniform in appearance.

I. Welding shall conform to AWS D1.1.

2.4 FINISH – STAINLESS STEEL

A. Factory Finish: Satin finish.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

B. Beginning of installation means erector accepts existing conditions.

3.2 PREPARATION

A. Obtain Project Representative approval prior to site cutting or making adjustments not

scheduled.

B. Clean and strip primed steel items to bare metal where site welding is required.

C. Supply steel items required to be cast into concrete or embedded in masonry with setting templates to appropriate sections.

3.3 INSTALLATION - MISCELLANEOUS ITEMS

A. Install items plumb and level, accurately fitted, free from distortion or defects.

B. Provide for erection loads and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.

C. Field weld components indicated on drawings.

D. Perform field welding in accordance with AWS D1.1.

3.4 ERECTION TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.

B. Maximum Offset From True Alignment: 1/4 inch.

C. Maximum Out-of-Position: 1/4 inch.

3.5 SCHEDULE

A. Provide and install items listed or shown on drawings with anchorage and attachments necessary for installation.

END OF SECTION

SECTION 061000 -ROUGH CARPENTRY

PART 1 - GENERAL

1.1 **REFERENCES**

A. APA - American Plywood Association.

B. AWPA - American Wood Preservers Association) Book of Standards.

C. WCLIB - West Coast Lumber Inspection Bureau.

D. WWPA -Western Wood Products Association.

E. SPIB – Southern Pine Inspection Bureau.

F. Structural General Notes.

1.2 **DELIVERY, STORAGE, AND PROTECTION**

A. Section 01 60 00 – Product Requirement: Transport, handle, store, and protect products.

1.3 **COORDINATION**

A. Coordinate and provide solid blocking for wall and ceiling mounted items.

B. Coordinate sequencing and installation of gypsum wallboard for firewall and ceiling assemblies.

1.4 **COLORS**

A. Colors are specified on Colors and Materials Schedule on the drawings.

PART 2 - PRODUCTS

2.1 **LUMBER MATERIALS**

A. Lumber Grading Rules: WCLIB or WWPA.

B. Lumber Materials:

1. Framing, Blocking, Plates, Beams, Stringers, Columns and Joists: Reference Structural General Notes.

2. Maximum Moisture Content : 19%.

3. Exterior Finished Lumber: Refer to specification Section 06 20 13

4. Pressure Treated Lumber: AWPA approved, #2 and better ACQ pressure treated Southern Pine lumber, water repellant; Premium Southern Gold Plus Water-Repellent Pressure treated lumber by Georgia-Pacific or equal.

2.2 SHEATHING MATERIALS

A. Plywood Grade and Species: Refer to Structural Notes.

B. Plywood Underlayment (Exterior Grade): Each sheet shall bear the trademark of the American Plywood Association (APA); the Engineered Wood Association. All plywood shall be APA Underlayment A-C Exterior Group I grade. Fully sanded faces both sides. Thickness: 3/8-inch [5/8-inch]. Fasteners: Use ring-shank or screw-shank nails.

2.3 ACCESSORIES

A. Nail Fasteners: See Structural General Notes; use hot-dipped galvanized steel. Use ring-shank nails at catwalk subfloor.

B. Joist Hangers and Framing Connectors: Galvanized steel, sized to suit loads, joists and framing conditions; Simpson, Bowman Morton Manufacturing & Machine, Seattle, WA or approved. Refer to Structural General Notes.

C. Anchors Bolts, Bolts, Nuts, Threaded Rods and Washers: Refer to Structural General Notes. Non-structural anchor bolts shall conform to ASTM A307.

1. Use hot-dipped galvanized type at exterior locations or where exposed to exterior environment.

2. Use stainless steel type where fasteners installed into concrete, brick masonry units and concrete masonry units.

D. Drywall Screws: ASTM C1002, bugle shaped heads, Type W.

E. Sill Sealer: 1/4 inch thick fiberglass, 5-1/2 inch wide.

F. Weather Resistive Barrier: Refer to Section 07 25 00 Weather Resistive Barrier.

G. Membrane Flashing (Self-Adhered): Refer to Section 07 25 00 Weather Resistive Barrier.

H. Subfloor Adhesive: APA approved, waterproof, cartridge dispensed.

I. Insect Screens: Bronze mesh insect screen, 20x20 mesh..

J. Attic Ventilation System (Insulation Baffle): Water-resistant, durable, lightweight PVC baffle. 100% recycled flame retardant PVC material. Install between rafter tails or trusses to provide an unobstructed air channel through insulation to maintain air flow within attic space from soffit vents to ridge vents. Color: Black. Dimensions: 22.5” width x 41” length

x 1.5" depth; 16 sq inches net-free-area.

K. Weather Resistive Barrier: As specified in Section 07 25 00.

L. Metal Flashing at Wall Openings: 20 gauge stainless steel. Refer to specification Section 07 62 00 Sheet Metal Flashing and Trim.

2.4 WOOD TREATMENT

A. Wood Preservative (Pressure Treatment): AWPA Treatment LP-2, C2 for lumber, C9 for plywood. After treatment, dry to maximum moisture content 19%.

B. Wood Preservative for Site Application: In accordance with AWPA M-4.

C. Treat all wood in contact with concrete, mortar, grout, masonry, and within 12 inch of earth; all wood over water; and all wood in contact with earth; in accordance with AWPA specifications for the Pressure Treatment of Western Woods, latest edition. Where possible, pre-cut material before treatment. All field cuts and drilled holes shall be field treated in accordance with AWPA M-4.

PART 3 - EXECUTION

3.1 FRAMING

A. Set structural members level and plumb, in correct position.

B. Make provisions for erection loads and for sufficient temporary bracing to maintain structure safe, plumb, and in true alignment until completion of erection and installation of permanent bracing.

C. Place horizontal members, crown side up.

D. Construct framing members' full length without splices.

E. Double members at openings over 1 sq ft. Space short studs over and under opening to stud spacing.

F. Construct double joist headers at floor and ceiling openings and under wall stud partitions that are parallel to floor joists. Frame rigidly into joists.

G. Bridge Joists in Excess of 8 ft Span: Fit solid blocking at ends of members.

H. Place full width continuous sill flashings under framed walls on cementitious foundations.

I. Coordinate installation of glue laminated structural units and wood trusses.

J. Curb roof openings except where prefabricated curbs are provided. Form corners by alternating lapping side members.

K. Provide framing members at all vertical ends/edges of gypsum wallboard and wall sheathing and at ends of floor sheathing.

L. Size rough openings for recessed electrical panels and other recessed equipment to receive gypsum wallboard in 1-hour walls.

M. Provide full depth 2x blocking between framing members wherever required by IBC, Building Official, structural drawings or good construction practice.

N. Provide full-depth 2x solid blocking in continuous row between wall framing members wherever abutted by fire rated ceilings.

O. Install insect screen at continues vent openings.

P. Provide solid 2x framing members to support toilet compartment pilasters above ceiling.

Q. Provide solid blocking or backing for all wall-mounted items.

3.2 PLYWOOD SHEATHING

A. Secure roof sheathing with longer edge perpendicular to framing members and with ends staggered and sheet ends overbearing.

B. Drill roof sheathing for required ventilation area at ridge vent assembly.

C. Secure catwalk subfloor sheathing perpendicular to floor framing with end joints staggered and sheet ends over firm bearing. Attach with continuous bead of subfloor adhesive and ring-shank nails.

D. Secure wall sheathing horizontally perpendicular to wall studs, with ends staggered, over firm bearing. Solid block edges with 2 inch x blocking. Screws at 8 inch o.c. maximum.

E. Weather Resistive Barrier: Provide weather resistive barrier over sheathing in accordance with Section 07 25 00.

F. Membrane Flashing: Provide membrane flashing at all exterior wall openings and penetrations in accordance with Section 07 25 00.

3.3 SITE APPLIED WOOD TREATMENT

A. Apply preservative treatment in accordance with manufacturer's instructions.

B. Brush apply preservative treatment on wood in contact with cementitious materials. Treat site-sawn cuts.

C. Allow preservative to dry prior to erecting members.

3.4 BACKING

A. Use only 2x6 (minimum) No. 1 or No. 2 Douglas Fir, free of splits or shakes, large knots, checks, holes, or wane.

B. Align face of backing flush with face of framing members.

C. Attach to framing members with minimum four 16 penny nails each piece (2 nails each end).

D. Replace any backing that splits during nailing.

3.5 COORDINATION

A. Install solid 2x wood backing for all wall and ceiling mounted items included in other Sections of these specifications including Division 23 and 26, and any Owner-furnished items shown on the Construction Documents.

B. Coordinate installation of glue laminated structural units, plywood web joists and open web trusses.

C. Coordinate wall tolerance requirements and backing requirements for gypsum wallboard and veneer plaster.

D. Coordinate opening sizes required for work of other trades.

E. Coordinate drilling, cutting, and notching performed by other trades so that structural integrity of framing members is not violated.

F. Coordinate location and height of framing to support expansion tanks with work of Division 23.

G. Coordinate location of solid backing to support toilet compartment pilasters with Section 10 28 13.

3.6 TOLERANCES

A. Faces of Abutting Framing Members: Flush alignment.

B. Framing Members: 1/8-inch maximum from true position.

C. Misalignment of Framing Members: 1/8-inch maximum between adjacent members at center of span/length.

END OF SECTION

SECTION 062013 - EXTERIOR FINISH CARPENTRY

PART 1 - GENERAL

1.1 **REFERENCES**

A. ANSI/ASTM D226 - Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.

B. APA – American Plywood Association.

C. AWS - Architectural Woodwork Standards. AWI - Architectural Woodwork Institute.

D. AWPA - American Wood Preservers Association) Book of Standards.

E. FS MMM-A-130 - Adhesive, Contact.

F. HPMA - Hardwood Plywood Manufacturer's Association. HP - American Standard for Hardwood and Decorative Plywood.

G. NHLA - National Hardwood Lumber Association.

H. PS 1 - Construction and Industrial Plywood.

I. WCLIB - West Coast Lumber Inspection Bureau. Standard Grading Rules for West Coast Lumber.

J. WWPA - Western Wood Products Association.

K. WRCLA- Western Red Cedar Lumber Association

1.2 **SUBMITTALS**

A. Submit under provisions of Section 01 33 00 – Submittal Procedures.

B. Shop Drawings: Indicate materials, component profiles, fastening methods and fastener layout, joint details, trim and accessories.

C. Samples: Submit (2) samples for each piece of finished lumber, decking, siding, panel and trim material specified. Submit (2) samples for each fastener specified. Submit samples illustrating specified finish.

D. Product data and manufacturer’s installation instructions.

1.3 **QUALITY ASSURANCE**

A. Lumber Grading: Certified by WWPA.

B. Plywood Panel Grading: Certified by APA.

C. Perform work in accordance with AWS/AWI Premium Grade quality standards.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Store and protect products under provisions of Section 01 60 00 – Product Requirements.

B. Store in ventilated areas with constant minimum temperature of 60 degrees F and maximum relative humidity of 55 percent.

1.5 COLORS

A. Colors are specified on the Colors and Materials Schedule on the drawings.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Exterior Trim (Solid Lumber): Western Red Cedar, A clear and better. Maximum moisture content 19%.

B. Exterior Finished Solid Lumber (Exposed): Clear Douglas Fir & Western Red Cedar. WWPA Standard Grading Rules.

1. Boards & Trim: 1x, 5/4x and 2x thickness. Clear Cedar & Fir, Prime Finish Grade, hand-selected material for visual acceptance, Kiln dried MC-15, S4S – exposed smooth faces. Wood members of sizes indicated on drawings.

2. Lumber (Studs, Joists and Rafters): 2-inch nominal thickness, hand-selected material for visual acceptance, Kiln dried MC-15, S4S – exposed smooth faces. Wood members of sizes indicated on drawings.

3. Lumber (Joists, Rafters, Purlins, Posts and Beams): 2-inch to 4-inch nominal thickness, hand-selected material for visual acceptance, Kiln dried MC-15, S4S – exposed smooth faces. Wood members of sizes indicated on drawings.

4. Timbers (Joists, Rafters, Purlins, Posts and Beams): 5-inch nominal and thicker, hand-selected material for visual acceptance, Kiln dried 19% maximum moisture content, S4S – exposed smooth faces. Wood members of sizes indicated on drawings.

C. Exterior Trim: “TruExterior” polymer-fly ash composite trim as manufactured by Boral Composites, Inc. As noted in drawings.

D. Refer also to drawing for sizes and special shapes and/or dimensions.

2.2 ACCESSORIES

A. Nails, Screws and Fasteners: Use stainless steel, corrosion resistant, type 316; non-staining, of size, length and strength to securely and rigidly retain the work.

B. Sheet Metal Flashing and Trim: As specified in Section 07 62 00 – Sheet Metal Flashing and Trim.

C. Asphalt Saturated Building Felt: No. 15 Asphalt Felt.

D. EPDM Backing Gasket: Black EPDM backing gasket for panel joints.

E. Continuous Soffit Vent: Cor-A-Vent Inc. S-400 Soffit Strip Bent, Black

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that substrate surfaces openings are ready to receive work.

B. Beginning of installation means installer accepts existing surfaces.

3.2 PREPARATION

A. Coordinate with Section 09 91 00 – Painting, for priming front and back faces, edges, and ends after cutting and prior to installation.

3.3 INSTALLATION – WEATHER RESISTIVE BARRIER

A. Install weather resistive barrier in accordance to manufacturer’s installation instructions and details.

B. Install membrane flashing at all exterior wall openings and wall penetrations. Install in accordance to manufacturer’s installation instructions and details.

3.4 INSTALLATION OF SIDING AND TRIM

A. Coordinate with exterior finished lumber work.

B. Install per manufacturer's instructions and WWPA installation standards.

C. Securely fasten in place, aligned, level, and plumb.

D. Place fasteners no closer than 3/8 inch from edges and 2 inches from corners.

E. Install metal flashings at head, jambs and sills of all wall openings and horizontal trim. Coordinate painting of flashing prior to installation with Section 09 91 00 - Painting.

F. Exercise care when site cutting. Locate cut ends over bearing surfaces. Sand cut edges smooth and clean.

G. Arrange for orderly, aligned and evenly spaced fastener pattern. Allow horizontal and vertical expansion and contraction of siding material.

H. Install sealant at all joints.

3.5 INSTALLATION OF FINISHED LUMBER

A. Install work in accordance with AWS/AWI Premium Quality Standards. Scarf and miter joints.

B. Coordinate exterior finished lumber work with other affected sections in this specification.

C. Scarf fascia and rake board joints.

D. Set and secure materials and components in place, plumb and level.

E. Install sealant specified under Section 07 92 00 – Joint Sealant, at exterior trim joints.

F. Unless otherwise shown, 45 degrees miter-cut all end joints on long runs and miter or cope at angles and corners as approved; all joint tight.

G. Install running finished lumber in as long lengths as practical.

H. All casings and trim to be backed out to allow firm tight fit over backing materials.

I. Make joints tight, miter trim.

J. Set nail heads and screws ready for puttying.

K. Clean up trim after installation by sandpapering and ease sharp external corners.

L. Ensure that mechanical and electrical items affecting this Section of work are properly placed, complete and have been inspected by the Design Consultant prior to commencement of installation.

3.6 INSTALLATION TOLERANCES

A. Maximum Variation From Plumb: 1/8 inch in 10 feet.

B. Maximum Offset From Joint Alignment: 1/32 inch.

3.7 PREPARATIONS FOR FIELD FINISHING

A. Set exposed nails.

B. Field Finishing: As specified in Section 09 91 00 - Painting.

C. Before installation, prime paint all surfaces and cut ends.

END OF SECTION

SECTION 062023 - INTERIOR FINISH CARPENTRY

PART 1 - GENERAL

1.1 **REFERENCES**

A. ANSI A135.4 - Basic Hardboard.

B. ANSI A208.1 - Mat Formed Wood Particleboard.

C. AWS - Architectural Woodwork Standards. AWI - Architectural Woodwork Institute.

D. FS MMM-A-130 - Adhesive, Contact.

E. HPMA (Hardwood Plywood Manufacturer's Association) HP - American Standard for Hardwood and Decorative Plywood.

F. NEMA (National Electric Manufacturers Association) LD3 – High-Pressure Decorative Laminates.

G. NHLA (National Hardwood Lumber Association).

H. PS 1 - Construction and Industrial Plywood.

I. PS 20 - American Softwood Lumber Standard.

1.2 **SUBMITTALS**

A. Submit under provisions of Section 01 33 00.

B. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details and accessories. Submit Interior elevations.

C. Samples: Submit two (2) samples of each material specified in this section, minimum 12 inch x 12 inch samples, illustrating specified color and finish.

D. Manufacturer’s installation instructions.

1.3 **QUALITY ASSURANCE**

A. Perform work in accordance with AWS/AWI Premium Grade quality standards.

B. Comply with "Quality Assurance" provisions, "References, Specifications and Manufacturer's Data".

1. Conform to referenced AWS/AWI standards; Section 2 – Care and Storage, for "Premium Grade" quality product.

2. Conform to referenced AWS/AWI standards; Section 3 - Lumber, for "Premium Grade" quality product.

3. Conform to referenced AWS/AWI standards; Section 4 – Sheet Products, for "Premium Grade" quality product.

4. Conform to referenced AWS/AWI standards; Section 5 - Finishing, for "Premium Grade" quality product.

5. Conform to referenced AWS/AWI standards; Section 6 - Millwork, for "Premium Grade" quality product.

6. Conform to referenced AWS/AWI standards; Section 8 – Wall / Ceiling Surfacing and Partitions, for "Premium Grade" quality product.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect, and handle products to site under provisions of Section 06 10 00 – Rough Carpentry.

B. Protect work from moisture damage.

1.5 QUALIFICATIONS

A. Fabricator and Installer: Company specializing in fabricating and installing the products specified in this Section with minimum three (3) years documented experience.

1.6 ENVIRONMENTAL REQUIREMENTS

A. Do not install materials when temperature or humidity conditions may have a detrimental effect on materials.

1.7 COORDINATION

A. Coordinate the work with plumbing and electrical rough-in; installation of associated materials, finishes and adjacent components; including interior signage.

1.8 COLORS

A. Colors are specified on the Colors and Materials Schedule on the drawings.

PART 2 - PRODUCTS

2.1 LUMBER MATERIALS

A. Solid Lumber: Graded in accordance with AWS/AWI Premium Grade quality. Species; Douglas Fir Grade I, maximum moisture content of 8 percent; Plain sawn lumber of AWS/AWI Premium Grade quality suitable for transparent finish.

1. Field Finishing: As specified in Section 09 91 00 – Painting.

2. Millwork: Refer to drawing for sizes and special shapes and dimensions. Shapes include base, wall moulding and trim, crown moldings, windowsills and casing. Fabricate to AWS/AWI Section 6, Premium Grade quality standard.

B. Refer also to drawing for sizes and special shapes and/or dimensions.

2.2 WINDOW SILL AND CASING MATERIALS

A. Window Sill Material: Solid Lumber as specified.

1. Refer to drawing for sizes, shapes and dimensions. Window sill shapes include stool and apron. Fabricate to AWS/AWI Section 6, Premium Grade quality standard.

B. Window Casing Material: Solid Lumber as specified.

1. Refer to drawing for sizes, shapes and dimensions. Window casing shapes include casing and standing trim. Fabricate to AWS/AWI Section 6, Premium Grade quality standard.

2.3 ACCESSORIES

A. Building Paper: No: 15 asphalt saturated felt.

B. Nails: Stainless Steel, size and finish type to suit application.

C. Bolts, Nuts, Washers, Blind Fasteners, Lags, and Screws: Concealed, Stainless Steel, Size and type to suit application; plain finish.

D. Primer: Alkyd primer sealer type.

E. Wood Filler: Solvent base, tinted to match surface finish color.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify adequacy of backing and support framing.

B. Verify mechanical, electrical, and building items affecting work of this Section are placed and ready to receive this work.

3.2 INSTALLATION OF MILLWORK

A. Install work in accordance with AWS/AWI Section 6, Premium Grade quality standard. Scarf and miter joints.

B. Set and secure materials and components in place, plumb and level.

C. Unless otherwise shown, 45 degrees miter-cut all end joints on long runs and miter or cope at angles and corners as approved; all joint tight.

D. Install running trim and handrails in as long lengths as practical.

E. All casings and trim to be backed out to allow firm tight fit over backing materials.

F. Make joints tight, miter casings and trim.

G. Set nail heads and screws ready for puttying.

H. Install trim with blind nailing and concealed fastening in accordance to AWS/AWI Section 6.

I. Install handrails with blind screws and concealed fastening in accordance to AWS/AWI Section 7.

J. Clean up trim after installation by sandpapering and ease sharp external corners.

K. Ensure that mechanical and electrical items affecting this Section of work are properly placed, complete and have been inspected by the Design Consultant prior to commencement of installation.

L. Scribe work abutting other components to AWS/AWI tolerances; with maximum gaps of 1/32 inch. Do not use additional overlay trim to conceal larger gaps.

3.3 INSTALLATION OF INTERIOR FINISH CARPENTRY ITEMS

A. Install work in accordance with AWS/AWI Premium Grade quality standard.

B. Install FRC panels in accordance to manufacturer’s installation instructions.

C. Set and secure materials and components in place, plumb and level.

D. Scribe work abutting other components to AWS/AWI tolerances; with maximum gaps of 1/32 inch. Do not use additional overlay trim to conceal larger gaps.

3.4 FINAL TREATMENT OF LUMBER MATERIALS SCHEDULED FOR FIELD APPLIED FINISHES

A. Sand work smooth and set exposed nails and screws to receive filler and leave ready to receive field applied finishes.

B. Priming: Before installation, all work in this Section scheduled to be painted or stained is to be primed or stained, as applicable, in a heated place at jobsite. Priming paints of finish

lumber specified under Section 09 91 00 - Painting; painter subcontractor will make an adequate quantity of priming material, of applicable types, to carpenters for priming jobsite cut ends, edges, and concealed surfaces, as the installation work proceeds.

C. Before installation, prime paint surfaces of items or assemblies to be in contact with cementitious materials.

D. Field Finishing: As specified in Section 09 91 00 - Painting.

E. Provide cutouts for plumbing fixtures, inserts, appliances, outlet boxes, and other fixtures and fitments. Verify locations of cutouts from site dimensions.

3.5 ERECTION TOLERANCES

A. Maximum Variation from True Position: 1/16-inch.

B. Maximum Offset from True Alignment with Abutting Materials: 1/32-inch.

END OF SECTION

SECTION 072100 - THERMAL INSULATION

PART 1 - GENERAL

1.1 **REFERENCES**

A. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.

B. ASTM C612 – Mineral Fiber Block and Board Insulation.

C. ASTM C739 - Standard Specification for Cellulosic Fiber Loose-Fill Thermal Insulation.

D. ASTM C665 - Mineral Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.

E. ASTM C1015 - Standard Practice for Installation of Cellulosic and Mineral Fiber Loose-Fill Thermal Insulation.

F. ASTM C1104 – Standard Test Method for Determining the Water Vapor Sorption of Unfaced Mineral Fiber Insulation.

G. ASTM C1149 - Standard Specification for Self-Supported Spray Applied Cellulosic Thermal Insulation.

H. ASTM E84 - Test Method for Surface Burning Characteristics of Building Materials. E 119-10a Standard Test Methods for Fire Tests of Building Construction and Materials

I. ASTM E136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750°C.

J. ASTM E970 - Standard Test Method for Critical Radiant Flux of Exposed Attic Floor Insulation

K. Using a Radiant Heat Energy Source

L. NFPA 255 - Test of Surface Burning Characteristics of Building Materials.

M. UL 723 - Tests for Surface Burning Characteristics of Building Materials.

N. Consumer Products Safety Commission (CPSC) 16 CFR Part 1209, Interim Safety Standard for Cellulose Insulation, and 16 CFR Parts 500 and 1404 where applicable.

O. Environmental Protection Agency (EPA) 40 CFR Part 247.12 Comprehensive Procurement Guideline For Products Containing Recovered Materials

1.2 **SUBMITTALS**

A. Submit under provisions of Section 01 33 00.

B. Product Data: Provide data on product characteristics, performance criteria, and limitations.

C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.3 **COLORS**

A. Colors are specified on Color and Materials Schedule on drawings.

PART 2 - PRODUCTS

2.1 **THERMAL BATT INSULATION MATERIALS**

A. Fiberglas Thermal Batt Insulation (Unfaced Fiberglass): ASTM C665; preformed glass fiber batt; friction fit, unfaced, widths required for snug, friction fit between framing free of gaps or voids. Product: Owens Corning "EcoTouch" or approved equal. Use: Non-exposed locations.

B. Mineral Wool Thermal Batt Insulation: Mineral wool batts; mineral fiber (inorganic material); rock and blast furnace slag); ASTM E136 noncombustible; moisture-resistant; ASTM C665 noncorrosive type I; non-deteriorating; mildew-proof; vermin-proof; 4.0 per inch of thickness. Unfaced Flame Spread = 0. Smoke Development = 0.

2.2 **CELLULOSE INSULATION MATERIALS**

A. Cellulose Insulation: Loose-Fill Cellulose Insulation Blown in Place, ASTM C1149, ASTM C739, ASTM C518, ASTM E970, ASTM E84, flame spread <25, Smoke Developed Index <50. Complies with EPA 40 CFR Part 247.12. No asbestos, mineral fibers, or formaldehyde are used in the manufacturing process. Thermal Performance: ASTM C 518-10, thermal performance varies with density and thickness. See the appropriate product coverage chart to calculate the R-value per inch if needed. All C 518-10 testing is done at a representative thickness of 4".

1. Used at all exterior wood stud walls, blown in place insulation from **interior side** of exterior walls, via open attic wall and through holes behind baseboards and behind window trim temporally removed and reinstalled after installation.

2.3 **PERIMETER FOUNDATION INSULATION MATERIALS**

A. Foundation Perimeter Insulation: Polystyrene (XPS) insulation, extruded cellular type, square edges, ASTM C578 Type IV, 25 psi minimum compressive strength, Dow Chemical Co. "Styrofoam," Owens Corning "Foamular," or approved.

2.4 **ACCESSORIES**

A. Insulation Hangers (Impaling Pins): 12-gauge, stainless steel pins and base plate of not less than 4 inches square for anchorage to substrate. Provide impaling pins of length to extend

beyond insulation and retain cap washer when self-locking washer is placed on the pin.

B. Vapor Barrier (Clear Polyethylene Film): Reinforced clear polyethylene film, 6 mil thick. Water Vapor Permeance of 0.06 (Class I Vapor Barrier). Use: Unfaced thermal batt insulation at non-exposed locations.

C. Tape: Polyethylene self-adhering type, 2 inch wide, and foil faced, self-adhering, reinforced, 2 inch wide.

F. Sealant: Suitable for sealing perimeters of vapor barrier membrane to adjacent materials, OSI SC-170.

G. Support Wire: 25 gauge, annealed steel wire.

H. Staples: Coated, non-rusting steel.

PART 3 - EXECUTION

3.1 **EXAMINATION**

A. Verify site conditions under provisions of General Conditions.

B. Verify that substrate, adjacent materials, and insulation are dry and ready to receive insulation.

3.2 **THERMAL BATT INSULATION INSTALLATION**

A. Remove any loose dust, dirt, foreign material, or films that may impair adhesion to application surfaces.

B. Install thermal batt insulation and vapor barrier in accordance with insulation and impaling pin manufacturer's instructions.

C. Install in exterior walls, roof, and ceiling spaces without gaps or voids. Do not compress insulation.

D. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.

E. Fit insulation tight in spaces and tight to exterior side of mechanical and electrical services within the plane of insulation.

F. Install vapor barrier membrane facing warm side of building spaces if wall studs are exposed during work.

G. Wood Stud Framing: Staple or nail vapor barrier in place at maximum 6 inch. Lap ends and sides of membrane over framing members.

H. Tape seal butt ends, lapped flanges, and tears or cuts in vapor barrier membrane. Seal perimeter to adjacent construction.

I. Insulation shall not block the required ventilation spaces in roof framing above insulation. Confirm that ventilation air passageways have the required free area above the top of the insulation in each joist bay from roof eave to ridge or other vent. Correct any blockages.

J. Pack insulation around New door frames in cracks, expansion joints, control joints, Pack behind outlets, around pipes, ducts, and services encased in wall or partition. Hold insulation in place with pressure sensitive tape or adhesive.

3.3 CELLULOSE INSULATION INSTALLATION

A. Install insulation in accordance with manufacturer's instructions!

B. Remove any loose dust, dirt, foreign material, or films that may impair adhesion to application surfaces.

C. Protect all nearby surfaces that are not intended to receive thermal insulation, e.g. outlets, windows, and doors.

D. Make sure there are no assembly details that appear to be preventing the application of the product per the manufacturer’s instructions.

E. For breathing protection, use a NIOSH approved N95 or higher disposable or reusable particulate respirator per 29 CFR 1910.134.

F. The work shall be coordinated with other trades whose work may be affected by or have an effect on the installation.

G. Care shall be taken to avoid damage to historic interior and exterior finish materials.

H. Insulation is to be blown in place thru existing openings at the top of the wall and as need behind the baseboard or trim from within the buildings.

I. New exterior drilled holes shall not be used to install the material.

3.4 PERIMETER FOUNDATION INSULATION INSTALLATION

A. Install insulation in accordance with manufacturer's instructions.

B. Run insulation board in continuous, unbroken line, butt joints tight, leave no voids or gaps.

END OF SECTION

SECTION 072500 - WEATHER RESISTIVE BARRIER

PART 1 – GENERAL

1.1 **REFERENCES**

A. NWCB – Northwest Wall and Ceiling Bureau

B. ASTM – American Society of Testing Materials

C. UL – Underwriters' Laboratories

D. WH – Warnock Hersey

E. GA – Gypsum Association

F. BM&WT – Building Materials and Wood Technology

1.2 **DELIVERY, STORAGE AND PROTECTION**

A. Section 01 60 00 – Product Requirements: Transport, Handle, Store and Protect Products.

1.3 **COORDINATION**

A. Coordinate installation with flashing installation.

B. Coordinate sequencing and installation of finish siding materials.

1.4 **QUALITY ASSURANCE**

A. Manufacturer Qualifications: Minimum 2 years production of similar products.

1.5 **SUBMITTALS**

A. Submit under provisions of Section 01 33 00.

B. Product Data: Manufacturer's data sheets on each product to be used, including:

C. Preparation instructions and recommendations.

D. Storage and handling requirements and recommendations.

E. Installation methods.

F. Manufacturer standard installation details.

1.6 DELIVERY, STORAGE AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

PART 2 - PRODUCTS

2.1 MATERIALS – MEMBRANE FLASHING (SELF-ADHERING)

A. Membrane Flashing (Self-Adhering): GCP Applied Technologies (W.R. Grace) or approved equal.

1. Vycor Plus: 25 mil thickness. Use: Sealing joints, seams, holes and unwanted openings in vertical surfaces. Window and door rough openings and other exterior wall rough openings. Not for use at roof areas.

2. Vycor V40: 40 mil thickness. Use: Sealing critical non-roof detail areas, joints, seams, wall terminations and intersection details. Masonry Walls. Not for use at roof areas.

3. VYCORners: Prefabricated corners for use at windows, doors, louvers and other exterior wall openings and penetrations.

4. Perm-A-Barrier Wall Flashing: 40 mil thickness. Use: Base of wall detail areas, foundation detail areas, parapet wall detail areas, vertical leg of metal flashings.

5. Perm-A-Barrier Detail Membrane: 3/64-inch thickness. Use: Detail areas, steel angles and steel framing, masonry wall details.

2.2 MATERIALS – MEMBRANE UNDERLAYMENT

A. Acceptable manufacturer: GCP Applied Technologies (W.R. Grace).

B. Membrane Underlayment: Grace Ice & Water Shield. Cold-applied, self-adhering membrane composed of a high-density, cross laminated polyethylene film coated on one side with a layer of rubberized asphalt adhesive. An embossed, slip resistant surface is provided on the polyethylene. Color: Gray-Black. 40 mil thickness. 36” wide rolls.

1. Installation: One layer of membrane underlayment on sloped surfaces at roof ridges, eaves, rakes edges, valleys, hips, dormers, sidewalls and roof penetrations.

2.3 ACCESSORIES

A. Provide Stainless Steel fasteners.

B. Manufacturer's tape compatible with exterior plywood sheathing, exterior gypsum sheathing, weather resistive barrier and membrane flashing materials.

C. Metal Flashing and Trim: As specified in Section 07 62 00.

D. Joint Sealants: Silicone sealant as specified in Section 07 92 00.

E. Adhesives: Manufacturer's recommended adhesives.

F. Primers: Manufacturer's recommended primers.

PART 3 - EXECUTION

3.1 INSTALLATION WEATHER RESISTIVE BARRIER (SHEET-APPLIED MEMBRANE)

A. Do not use materials with defects that impair quality of product.

B. Tape exterior sheathing butt joints prior to installation of weather resistive barrier.

C. Cover exterior sheathing with weather resistive barrier.

D. Coordinate weather resistive barrier installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.

E. Extend weather resistive barrier coverage to interior side of wall openings at stud framing (heads / jambs / sills) prior to installation of membrane flashings at rough openings.

F. Install in accordance with manufacturer's application instructions.

3.2 INSTALLATION MEMBRANE FLASHING AND ACCESSORIES

A. Rough openings in exterior walls shall have membrane flashing placed on wall surfaces as indicated on drawings and as listed below:

1. Membrane flashing shall extend to interior side of wall opening (full depth of opening) at all sides of opening. Membrane flashing shall extend a minimum of 9 inches beyond face of opening at all sides, lapping over weather resistive barrier.

2. Frames shall have membrane flashing adhesively attached to the frame.

3. Openings shall have metal head and sill flashing installed in accordance to drawings.

3.3 INSTALLATION DRAINAGE MAT

A. Install in accordance with manufacturer's instructions.

B. Inspection of roof deck conditions and Weather Resistive Barrier: Assure that the roof is free from structural defects, that any membranes or flashing are properly installed, and that the final system will have a path for moisture to escape from the wall.

3.4 INSTALLATION MEMBRANE UNDERLAYMENT

A. Install membrane underlayment in accordance with manufacturer's instructions.

END OF SECTION

SECTION 073129 - WOOD SHINGLES

PART 1 GENERAL

1.1 **REFERENCES**

A. ASTM A153 - Standard Specification for Zinc Coating (Hot Dip) on Iron and Steel Hardware.

B. ASTM A493 - Standard Specification for Stainless Steel Wire and Wire Rods for Cold Heading and Cold Forging.

C. ASTM D226 - Standard Specification for Asphalt-Saturated Organic Felt Type II Used in Roofing and Waterproofing.

D. ASTM D 4716 – Standard Test Method for Determining the (In-Plane) Flow Rate per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using a Constant Head.

E. ASTM D4869 - Standard Specification for Asphalt-Saturated Organic Felt Type IV Underlayment Used in Steep Slope Roofing.

F. ASTM D 5035 – Standard Test Method for Breaking Force and Elongation of Textile Fabrics (Strip Method).

G. ASTM D 5261 – Standard Test Method for Measuring Mass per Unit Area of Geotextiles.

H. ASTM E 84 - Test Method for Surface Burning Characteristics of Materials.

I. ASTM E108 - Standard Test Methods for Fire Tests of Roof Coverings.

J. CSSB: Cedar Shake and Shingle Bureau. Roofing Manual & Wall Manual's

K. SMACNA: Sheet Metal & Air Conditioning Contract's National Association

L. NRCA – National Roofing Contractors Association, 2017 Roofing Manual: Steep-slope Roof Systems

M. Underwriters Laboratories.

1.2 **SUBMITTALS**

A. Submittals Package: Submit the product data, samples, and quality control submittals specified below at the same time as a package.

B. Product Data: Catalog sheets, specifications, and installation instructions for each material specified, except for nails.

C. Samples:

1. Shingles: Two representative units of each type, size, pattern, and color.
2. Nails: 3, each type.

3. Concealed Flashing: 6-inch square piece.
4. Ventilation Mat

D. Shop Drawings: Include details of materials, construction, and finish. Include relationship with adjacent construction.

E. Material Certificates: All shingle or shake bundles shall bear the CSSB bureau label

1.3 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with a minimum five years documented experience.

B. Installers Qualifications: The crew chief or foreman and at least one other member of the roofing crew shall have previously installed at least 6 wood shingle roof systems and shall be thoroughly familiar with all aspects of the installation.

C. Preinstallation Conference: Two weeks before the roofing work is scheduled to commence, schedule a meeting to be attendees shall include Project Representative, Contractor and trades involved. Agenda shall include schedule, responsibilities, critical path items and approvals.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to the site in the manufacturer's labeled unopened containers.

B. Store and handle in strict compliance with manufacturer's written instructions and recommendations.

C. Protect from damage due to weather, excessive temperature, and construction operations.

D. Allow all cedar roofing products to acclimate to site conditions before installing.

1.5 PROJECT CONDITIONS

A. Do not install shingles on wet surfaces.

B. Do not perform the Work of this Section unless the Director's Representative is present or unless he directs that the Work be performed during his absence.

C. Moisture Protection:

1. Cover, seal or otherwise protect the roof and flashings so that water cannot accumulate or flow under completed portions. When and where necessary to accomplish this, provide temporary water cut-offs.

2. Limit the removal of existing materials to areas that can be completely re-roofed or temporarily protected within the same day.

1.6 SUBSTITUTIONS

A. Substitutions under provisions of Section 01 60 00 Product Requirements.

1.7 WARRANTY

A. Manufacturer's Warranty: Provide manufacturer's standard limited warranty.

1.8 COLORS

A. Treated Cedar Shingles, no additional finish color.

PART 2 PRODUCTS

2.1 MATERIALS

A. Cedar Roofing Shingles: Western red cedar shingles certified by the CSSB.

1. Grade: Number 1, Blue Label, 100 percent clear, edge grain, heartwood
2. Size: 18 inches by 5/2-1/4, 5 butt ends equal 2-1/4 inches.
   a. 4/12 and Greater Blue Label Maximum Exposure: 5-1/2 inches.
3. Treatment: Pressure-impregnated. Certi-Guard as manufactured by Members of the Cedar Shake and Shingle Bureau.
4. Finish: Natural, Fire Retardant.
5. Fire Rating: Class A:
   a. Class A system B Certi-Guard fire-retardant pressure impregnated treated shingles.
   b. Class A system B fire-treated, starters, hips, and ridges.
   c. Decking: Exterior Plywood: 1/2 inch minimum, refer to structural drawings and as need for repairs.

D. Cap Sheet: Mineral surfaced, Class A Fiberglass per UL 55-A. Must cover entire deck, beginning at the eaves. Contact the treatment company for specification of accessory building product requirements, including fasteners.
   a. Fiberglass sheets must be 36 inch wide, 76 lbs.

E. Starter Course: 18-inch-long min. starter course shingle.

F. Permeable Underlayment: Felt No. 30 ASTM D226 Type II, asphalt saturated.

G. Weather Barrier Underlayment: Refer to Section 07 25 00

H. Ventilation underlayment & Ridge Vent.

1. Manufacturers:
   a. Advanced Building Products, CedAir-Mat.:
   b. Benjamin Obdyke: Cedar Breather / Rapid Ridge 7
   c. or approved equal.
2. Fire Rating: Class A

3. Install roofing shingles per CSSB and mat manufacturer's recommendation.

F. Concealed Membrane Flashing: Self adhering, self- sealing, rubberized asphalt sheet membrane with manufacturer's primer for masonry surfaces. Refer to Section 07 25 00 Weather Resistive Barrier.

G. Nails For Shingles:

1. Nail Length and Material: 6d, Stainless Steel type 316, nails.

2.2 METAL FLASHING

A. Roof and chimney flashing

1. General Roof Flashing: 24-gauge galvanized Steel
   a. Prefinished-painted baked enamel.
   b. hot dip galvanized sheet steel complying with ASTM A 653M G90.Z275
2. Chimney Flashing: Refer to SMACNA figure 4-17.

2.3 ATTIC VENTILATION

A. Ridge Vents: Continuous ridge vent designed to allow the passage of hot air from attics, while resisting snow infiltration. For use in conjunction with eave/soffit ventilation products.
   1. Net Free Ventilation Area (NFVA): 12.5 sq inches per lineal ft

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not proceed with application of shingles until all surfaces are dry, free of all debris and protruding nails, and properly supported for shingle nailing and application.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Verify that the deck is dry, sound, clean and smooth. It shall be free of any depressions, waves, and projections.

C. Replace damaged deck with new materials to match existing.

D. Clean deck surfaces thoroughly prior to installation of eaves protection membrane and underlayment.

3.3 INSTALLATION

A. Installing Concealed Flashings:

1. Apply the flashing manufacturer's primer over all masonry wall surfaces (if any), before installing flashing. Lap edges and ends a minimum of 6 inches. Press flashing into place. Cut out and patch all blisters. Roll edges and ends to insure complete adhesion.

2. Install ventilation mat

3. Eaves: Unless shown otherwise on the drawings extend the Weather Resistant Barrier flashing from the roof edge to a line a minimum of 2 ft beyond the interior face of the building wall.

4. Ridge: Install the ridge roll flashing centered on ridge so that the flashing sheet extends a minimum of 8 inches on each side of the center line.

5. Chimney: Install 18-inch-wide concealed membrane flashing. Extend the flashing one ft onto the roof surface and 6 inches up the vertical surface.

B. Installing Shingles:

1. Install shingles per CSSB and manufactures standards for Class A roof.
2. Install one ply of felt underlayment over the entire surface to be shingled. Lap edges a minimum of 2 inches and ends a minimum of 6 inches.
3. Start shingles at eaves with a starter course so that the first course of shingles is doubled. Set the first and starter course of shingles so that they project beyond the metal drip edge one inch.
4. Double layer of shingles every fifth course starting in the fourth course from the lower edge of the roof. Double coursing of shingles matches original roof layout based on 1910 photograph.
5. Space shingles not less than 1/4 inch apart from adjacent shingle and not more then 3/8 inch.
6. Stagger joints in courses so that no joints in any three adjacent courses are in alignment.
7. Shingle Weather Exposure:
    a. 18 inch shingle: 5-1/2 inch exposure.
8. Chimney Flashing: (Refer to SMACNA figure 4-17. And CSSB fig. 14c). Extend up chimney to a height not less than 4 inches, up the roof slope to a point equal in height to the flashing on the chimney but never less than 1-1/2 times shingle exposure.

a. Step Flashing: Minimum height of 4 inches

b. Install metal flashings to comply with SMACNA and CSSB requirements & standards.

9.. Metal Ridge Roll Flashing per drawings.

10. Nailing Shingles:

a. Secure each shingle with two nails. Place each nail not more than 3/4 inch from the side of the shingle and not more than 2 inches above the butt line of the next course.

b. Drive nails flush without driving the nail heads into the shingles or crushing the wood.

C. Fire Rating Class A System installation:

1. Install self-adhering weather resistive barrier per Section 07 25 00
2. Cap Sheet installation: Lay mineral-surfaced Class "A" fiberglass cap sheet, over sheeting, the horizontal edge of sheet must meet a solid nailing surface and overlap the next layer. 2-inch minimum at joints, both sides and ends of each sheet and attached with sufficient fastener quantities to hold the sheet in place preventing movement prior to shingles application.
3. Along Eaves Line: Lay a 36-inch-wide strip of No 30-roofing felt, over the mineral-surfaced Class "A" fiberglass cap sheet.
4. Install ventilation matt per manufacturers recommendations.
5. After each course of shingles is applied, an 18-inch-wide strip of No. 30 roofing felt is laid over the top portion of the shingles extending onto the sheathing, with the bottom edge of the felt positioned at a distance above the butt equal to twice the weather exposure.
6. Wash and rinse entire roof, less than 125 psi immediately after application.

3.4 CLEANING

A. Clean products in accordance with the manufacturer's recommendations.

END OF SECTION

SECTION 076200 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 **REFERENCES**

A. AISI (American Iron and Steel Institute) - Stainless Steel - Uses in Architecture.

B. ASTM A653 – Steel sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

C. ASTM A792 – Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.

D. ASTM B209 Aluminum and Alloy Sheet and Plate.

E. NRCA (National Roofing Contractors Association) - Roofing Manual.

F. SMACNA - Architectural Sheet Metal Manual.

G. AAMA – American Architectural Manufacturers Association.

H. AAMA 611 – Specification for Anodized Architectural Aluminum.

I. AAMA 2605 – Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Architectural Extrusions and Panels.

J. AA - Aluminum Association. Aluminum Design Manual.

K. PCI – Powder Coating Institute.

1.2 **SUBMITTALS**

A. Submit under provisions of Section 01 33 00 – Submittal Procedures.

B. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.

C. Samples: Submit two (2) samples, illustrating typical material, color and finish.

1.3 **QUALIFICATIONS**

A. Fabricator and Installer: Company specializing in sheet metal flashing work with three (3) years experience.

1.4 **DELIVERY, STORAGE, AND HANDLING**

A. Deliver, store, protect, and handle products to site under provisions of Section 01 60 00 – Product Requirements.

B. Stack preformed material to prevent twisting, bending, or abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.

C. Prevent contact with materials that may cause discoloration or staining.

1.5 **COLORS**

A. Colors are specified on Colors and Materials Schedule on the drawings.

PART 2 - PRODUCTS

2.1 **MATERIALS – SHEET METAL**

A. Steel Sheet: ASTM A792, AZ-60 Zincalume / Galvalume (Aluminum-Zinc hot dip coating) steel sheet, minimum yield 50,000 psi, minimum 20- & 24-gauge thickness if not specified under components. Factory Finish.

B. Stainless Steel Sheet: ASTM A167, alloy 304 stainless steel sheet, minimum 24-gauge thickness if not specified under components. Factory Finish.

C. Aluminum Sheet: ASTM B209, alloy 5005 aluminum sheet, minimum (20 gauge) thickness if not specified under components. Factory Finish.

2.2 **COMPONENTS**

A. Exterior Wall Flashing (Base of Wall): Stainless steel sheet material. Minimum 20-gauge thickness.

B. Flashing for Cedar Shingle Roofs: Prefinished painted 24-gauge galvanized steel flashing.

C. Roof Penetration Flashing: fabricate per SMACNA figure 4-19 A

D. Chimney Flashing:

1. Metal Roof: fabricate flashing per SMACNA figure 4-17 but with an apron flashing similar to figure 6-21 for a metal roof. Minimum thickness of 20 gauge, painted galvanized steel.

E. Exterior Wall Opening Flashing (Windows, Doors, Louvers): Stainless Steel sheet material. Minimum thickness of 24 gauge.

F. Ridge Roll Flashing with Ball Terminator end caps. 3” diameter, roll, minimum thickness 24 gauge Galvalume Steel, painted Kynar finish. Ball Terminator, galvalume steel with 3” dia. stainless steel ball, Kynar finish. Similar to Old World Distributors inc. 1 ¼” -3” Ball.

2.3 **ACCESSORIES**

A. Fasteners: Stainless steel screws with soft neoprene washers. Stainless steel rivets.

B. Felt Underlayment: ASTM D226, No. 15 asphalt saturated roofing felt.

C. Slip Sheet: Red Rosin building paper. W.R. Meadows Seal tight.

D. Protective Backing Paint: Bituminous coating.

E. Sealant: As specified in Section 07 92 00 – Joint Sealants.

F. Isolation Tape (Dissimilar Metal Tape): Kelcom Inc or equal. Separation tape.

G. Neoprene Tape (Weather Stripping): Kelcom Inc or equal. Neoprene tape. Compressible closed cell used for sealing and weather stripping.

H. Butyl Tape (Sealing): Kelcom Inc or equal. Butyl tape. Used for watertight seal between two substrates.

2.4 FABRICATION

A. Shop-fabricate work to greatest extent possible and comply with details shown and with applicable requirements of SMACNA Architectural Sheet Metal Manual.

B. Field measure site conditions prior to fabricating work.

C. Form the work to fit substrates. Comply with material manufacturer instructions and recommendations for forming material.

D. Fabricate with required connection pieces.

E. Form sections square, true, and accurate in size and shape, in maximum possible lengths but not less than 10 feet in length and free of distortion or defects detrimental to appearance or performance. Allow for expansion at joints where required by SMACNA recommendations. Keep joints to minimum, but any joint that is required, shall be provided with butt seam with concealed backup plate at joints unless specified otherwise. Coordinate joint layout with Project Representative prior to installation of sections.

F. Hem exposed edges of metal.

G. Mitered and soldered or welded fabricated components.

H. Seam and install sealant at metal joints watertight.

I. Form exposed sheet metal work without excessive oil-canning, buckling and tool marks, true to line and levels indicated with exposed edges folded back to form hems.

J. Fabricate sheet metal flashing, trim and components of specified profiles and shapes such that all visible exposed surfaces shall be of color and finish as specified. Conditions where both sides of the sheet metal material surface is visibly exposed to view;

Contractor has option to provide single-piece of sheet metal material with specified color and finish on both visibly exposed surfaces or provide 2-pieces of sheet metal material with specified color and finish on one surface, fabricate the item with the two sheet metal material pieces back-to-back such that all visible exposed surfaces are of color and finish specified.

2.5 **FINISH**

A. Steel: Prefinished Painted Galvanized steel

B. Stainless Steel: Factory Finish: 2B mill finish.

C. Aluminum: Prefinished Painted

PART 3 - EXECUTION

3.1 **EXAMINATION**

A. Verify that surfaces are ready to receive work.

B. Verify roof openings, curbs, pipes, sleeves, ducts, or vents through roof are solidly set, reglets in place, and nailing strips located.

C. Verify roofing termination and base flashings are in place, sealed, and secure.

D. Beginning of installation means acceptance of substrate.

3.2 **PREPARATION**

A. Install starter and edge strips, and cleats before starting installation.

3.3 **INSTALLATION**

A. Except as otherwise indicated, comply with manufacturer’s installation instructions and recommendations and with SMACNA Architectural Sheet Metal Manual.

B. Install flashing, trim and break shapes, reglets and counter flashing system, gutters, downspouts, eave and rake flashings, and accessories in accordance with manufacturer's instructions and SMACNA manual. Coordinate installation of flashings with other sections.

C. Install isolation tape between dissimilar metals.

D. Secure flashings in place using concealed fasteners. Use exposed fasteners only where permitted.

E. Fit flashings tight in place. Make corners square, surfaces true and straight in planes, and

lines accurate to profiles.

F. Install work with laps, joints and seams that will be permanently watertight and weatherproof.

G. Drip edge flashing shall be provided with butt seam with concealed backup plate at joints; form drip edge flashing in sections as long as possible, but not less than 10 feet in length. Coordinate joint layout with Architect prior to installation of drip edge flashing.

H. Trim, flashing and break shapes shall be provided with butt seam with concealed backup plate at joints; form trim, flashing and break shapes in sections as long as possible, but not less than 10 feet in length. Coordinate joint layout with Project Representative Architect prior to installation of trim, flashing and break shapes.

I. Join lengths with seams of joint type allowing flush alignment of adjacent lengths, sealed watertight and allowing for thermal movement. Flash and seal gutters to downspouts and accessories.

J. Slope gutters 1/16 inch per foot towards downspouts for positive drainage.

K. Locate gutter expansion joints and unrestrained gutter terminations indicated to allow for thermal movement. Fix gutter at inside corners and outlet tubes.

L. Install downspout hangers at 12 inch maximum distance from each end of downspout in contact with exterior wall and maximum 10 feet O.C. vertical spacing. Install minimum of (3) hangers for each downspout.

M. Seal and seal metal joints watertight. Coordinate with Section 07 92 00 for sealants.

N. Secure flashings in place using concealed fasteners and cleats.

END OF SECTION

SECTION 079200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 **REFERENCES**

A. ASTM C661 - Standard Test Method for Indentation Hardness of Elastomeric Type Sealants by Means of a Durometer.

B. ASTM C834 - Latex Sealants.

C. ASTM C920 - Elastomeric Joint Sealants.

D. ASTM C1248 - Test Method for Staining of Porous Substrate by Joint Sealants.

E. ASTM C1311 - Standard Specification for Solvent Release Sealants.

F. ASTM C1330 - Cylindrical Sealant Backing for Use with Cold Liquid Applied Sealants.

G. ASTM D2240 - Standard Test Method for Rubber Property - Durometer Hardness.

H. SWRI (Sealant, Waterproofing and Restoration Institute) - Sealant and Caulking Guide Specification.

I. SWRI (Sealant, Waterproofing and Restoration Institute) – Validation Program.

1.2 **SUBMITTALS**

A. Submit under provisions of Section 01 33 00 Submittal Procedures.

B. Data: Provide data indicating sealant chemical characteristics, performance criteria, substrate preparation, limitations, and color availability. Colors will be selected by Project Representative from manufacturer's full line of available colors.

C. Samples for Color Selection: For each joint sealant type.

D. Mockups: Provide joint sealant application within mockups required in other sections identical to specified joint sealants and installation methods.

1.3 **QUALIFICATIONS**

A. Manufacturer: Company specializing in manufacturing the products specified in this Section with minimum five (5) years documented experience.

B. Applicator: Company specializing in performing the work of this Section with minimum five (5) years experience approved by manufacturer.

1.4 **ENVIRONMENTAL REQUIREMENTS**

A. Maintain temperature and humidity recommended by the sealant manufacturer during and after installation.

1.5 **WARRANTY**

A. Provide one (1) year warranty.

B. Warranty: Include coverage for installed sealants and accessories that fail to achieve watertight seal and exhibit loss of adhesion or cohesion, or do not cure.

C. Special Manufacturer's Warranty: Manufacturer's standard form in which joint sealant manufacturer agrees to furnish joint sealants to repair or replace those that demonstrate deterioration or failure under normal use within warranty period specified.

1. Warranty Period for Silicone Sealants: Twenty (20) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 **MATERIALS**

A. General:

1. Compatibility: Provide joint sealants and accessory materials that are compatible with one another and with materials in close proximity under use conditions, as demonstrated by sealant manufacturer using ASTM C1087 testing and related experience.

2. Stain Test Characteristics: Where sealants are required to be nonstaining, provide sealants tested per ASTM C 1248 as non-staining on porous joint substrates indicated for Project.

B. Liquid Joint Sealants:

1. Acrylic Latex Sealant:
Siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.

Pecora AC20 + Silicone.
Sonneborn Sonolac.
Tremco Tremflex 834.

Use in the following locations:

a. Interior perimeter joints of interior frames.
b. Interior non-moving joints between interior painted surfaces and adjacent materials.

2. Butyl-Rubber-Based Sealant:
ASTM C 1311.

Tremco Butyl Sealant.

Use in the following locations:

a. Interior concealed sealants at thresholds and sills.

3. Single-Component, Nonsag, Neutral-Curing Sealant:
ASTM C 920, Type S, Grade NS, Class 50, for Use NT, G, M, and A; SWRI validation.
Hardness, ASTM D 2240: 34 durometer Shore A, minimum.

Dow Corning Corporation, 791 Silicone Weatherproofing Sealant.

Use in the following locations:

a. Interior perimeter joints of exterior frames.

4. Paintable Urethane Acrylic Sealant:

OSI Pro Series H2U Acrylic Urethane.
Benjamin Moore Moorlastic Urethane Acrylic Sealant 465.

Use in the following locations:

Exterior joints in wood siding to be painted.

5. Single-Component, Nonsag, Non-Staining, Neutral-Curing Silicone Sealant:
ASTM C920, Type S, Grade NS, Class 100/50, for Use NT, G, M, A, and O; SWRI validation. Hardness, ASTM D2240: 15 durometer Shore A.
Staining, ASTM C1248: None on concrete, granite, limestone, and brick.

Dow Corning 790 Silicone Building Sealant.
Tremco Spectrem 3.

Use in the following locations:

a. Exterior construction joints in cast-in-place concrete. Above-grade.

6. Mildew-Resistant, Single-Component, Nonsag, Acid-Curing Sealant:
ASTM C 920, Type S, Grade NS, Class 25, for Use NT.
NSF Standard 51 and FDA Regulation No. 21 CFR 177.2600 compliant.
Hardness, ASTM D 2240: 25 durometer Shore A, minimum.

Dow Corning Corporation, 786 Silicone Sealant.
Sonneborn OmniPlus.
Tremco Tremsil 200.

Use in the following locations:

a. Interior sanitary joints between plumbing fixtures and food preparation

fixtures and casework and adjacent walls, floors, and counters.

8. Single Component Urethane Sealant:

   Pecora Dynatrol 1-XL
   Sonneborn Sonolastic NP-1
   Tremco Dymonic

   Use in the following locations:

   a. Expansion joints in ceramic tile floors.

9. Single Component High Performance Neutral Cure Silicone Sealant:

   Dow Corning 780 Plumber and Roofing Sealant.

   Use in the following above-grade locations:

   a. Sealant for sheet metal and aluminum gutters and rainwater accessories.

C. Sealant Color: As selected by Project Representative.

2.2 ACCESSORIES

A. Joint Substrate Primers: Substrate primer recommended by sealant manufacturer for application.

B. Cylindrical Sealant Backing: ASTM C 1330, Type B non-absorbent, bi-cellular material with surface skin, Type C closed cell polyethylene or Type O open-cell polyurethane, as recommended by sealant manufacturer for application. Diameter 1/3 to 1/2 greater than width of joint where it is to be installed.

1. Polystyrene foam not acceptable.

C. Bond Breaker Tape: Polymer tape compatible with joint sealant materials and recommended by sealant manufacturer.

D. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.

E. Bond Breaker: Pressure sensitive polyethylene tape/plastic tape recommended by sealant manufacturer, applied to sealant contact surfaces where bond to substrate or backer rod must be avoided for proper performance of sealant.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that substrate surfaces and joint openings are ready to receive work.

B. Verify that joint backing and release tapes are compatible with sealant.

3.2 PREPARATION

A. Remove loose materials and foreign matter that might impair adhesion of sealant.

B. Clean joints in accordance with manufacturer's instructions.

C. Perform preparation in accordance with ASTM C804 for solvent release and ASTM C790 for latex base sealants.

D. Verify that joint backing and release tapes are compatible with sealant.

E. Protect elements surrounding the work of this Section from damage or disfiguration.

3.3 REMOVAL OF EXISTING SEALANT AND BACKING

A. Remove existing joint sealants and backing as shown on drawings and identified during inspection specified in Paragraph 3.1. Do not remove silicone joints to be recapped and joints to be covered with silicone seals.

B. Cut existing sealant close to joint edges.

C. Clean joint with power or hand wire brush, grinding, saw cutting, or solvent cleaning to depth at which replacement backing and sealant are to be installed.

D. Blow out dust, loose particles, and debris with moisture and oil-free compressed air. Remove any pieces of caulk and backer rod lodged in joint.

3.4 PRIMER APPLICATION

A. General: Install primer wherever recommended by sealant manufacturer for conditions/materials being sealed to achieve manufacturer's published joint performance criteria including applicable federal specifications.

B. Prime all exterior joints, using primer recommended by sealant manufacturer for substrate/conditions.

3.5 INSTALLATION

A. Install sealant in accordance with manufacturer's instructions.

B. Measure joint dimensions and size materials to achieve required width/depth ratios. Minimum joint width for exterior joints not indicated otherwise shall be ¼ in.

C. Install joint backing to achieve a neck dimension no greater than 1/3 of the joint width.

D. Install bond breaker where joint backing is not used.

E. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.

F. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.

G. Tool joints concave, unless noted otherwise.

H. Remove improperly applied sealant and replace with new.

3.6 PRE-FORMED JOINT SEALANTS

A. Sealant: Apply bead of silicone sealant on each side of joint and 1/4 inch inside masking tape.

1. Bead size:

a. Rough substrate: 1/4 inch.

b. Smooth substrate: 1/8-inch.

2. Minimum bonding area: 3/8 inch.

B. Preformed Silicone seal: Within 10 minutes of sealant application, press silicone extrusion into wet sealant. Apply consistent pressure with roller to ensure uniform contact.

C. Complete horizontal joints prior to vertical joints. Lap vertical seal over seal on horizontal joint.

D. At joint ends, cut extrusion with razor knife.

E. Cleaning: Remove masking tape and excess sealant.

3.7 CLEANING

A. Clean work under provisions of Section 01 77 00.

B. Clean adjacent soiled surfaces.

3.8 PROTECTION OF FINISHED WORK

A. Protect sealants until cured.

B. Repair or replace defaced or disfigured finishes caused by work of this Section.

END OF SECTION

SECTION 081433 - STILE AND RAIL WOOD DOORS

PART 1 - GENERAL

1.1 REFERENCES

A. AWS - Architectural Woodwork Standards. AWI - Architectural Woodwork Institute.

B. HPMA HP - Hardwood and Decorative Plywood.

1.2 SUBMITTALS

A. Submit product data under provisions of Section 01 33 00.

B. Shop Drawings: Indicate door elevations, stile and rail reinforcement, internal blocking for hardware attachment, and cutouts for glazing.

C. Product Data, including materials, finish, exterior rating and warranty.

1.3 QUALITY ASSURANCE

A. Perform work in accordance with AWS/AWI Premium Grade quality standards.

B. Conform to referenced AWS/AWI standards; Section 2 – Care and Storage, for "Premium Grade" quality product.

C. Factory Finish doors and frames in accordance with AWS/AWI Quality Standard Section 5 - Finishing; Premium Grade quality standards.

D. Fabricate and install door frames in accordance with AWS/AWI Quality Standard Section 6 - Millwork; Premium Grade quality standards.

E. Fabricate and install doors in accordance with AWS/AWI Quality Standard Section 9 - Doors; Premium Grade quality standards.

F. Manufacturer: Company specializing in manufacturing the products specified in this Section with minimum three (3) years documented experience.

1.4 DELIVERY, STORAGE, AND PROTECTION

A. Section 01 60 00 – Product Requirements: Transport, handle, store, and protect products.

B. Package, deliver, and store doors in accordance with AWS/AWI Section 2 requirements.

1.5 WARRANTY

A. Provide one (1) year manufacturer's warranty against material defects and warpage under provisions of Section 01 77 00.

1.6 COLORS

A. Colors are specified on Color and Materials Schedule on drawings.

PART 2 - PRODUCTS

2.1 DOORS AND FRAMES

A. Custom doors and frames to match historic door configuration and profiles.

2.2 ACCEPTABLE MANUFACTURERS

A. Simpson Door Company

B. Substitutions: Under provisions of Section 01 60 00.

2.3 DOOR TYPES

A. Exterior Doors (Stile and Rail): 2-1/4 inch thick; solid core construction; wood veneer facing, panel layout as shown on drawings. AWS/AWI Premium Grade quality standard.

B. Interior Doors (Stile and Rail): 1-3/4 inch thick; solid core construction; wood veneer facing, panel layout as shown on drawings. AWS/AWI Premium Grade quality standard.

2.4 DOOR CONSTRUCTION (INTERIOR DOORS)

A. General: Fabrication in accordance to AWS/AWI Section 9; Premium Grade quality standards.

B. Stile and Rail Moulded stop profile and Raised Panel profile to match existing historic doors.

C. Stile and Rail Construction: Stile and rails shall be 5-1/2 inch wide minimum; except for ADA compliant bottom rail shall be 11 inch wide. Stile and rail constructed of solid lumber as illustrated in AWS/AWI figure 9-039 Section A-A.

D. Panel Construction: Panels shall be 2-ply lumber raised panels as illustrated in AWS/AWI figure 9-040 Section A-A.

1. Horizontal grain direction for panels as illustrated in AWS/AWI figure 9-038.

E. Adhesives: Type 1 Waterproof adhesives for all doors.

F. Panel and Glass Retention: Solid lumber and moulded stops profiles; material and finish to match stile and rail construction. Provide moulded Stops as illustrated in AWS/AWI figure 9-041 Section A-A.

2.5 DOOR CONSTRUCTION (EXTERIOR DOORS)

A. General: Fabrication in accordance to AWS/AWI Section 9; Premium Grade quality standards.

B. Stile and Rail Moulded stop profile and Raised Panel profile to match existing historic doors.

C. Stile and Rail Construction: Stile and rails shall be 5-1/2 inch wide minimum; except for ADA compliant bottom rail shall be 11 inch wide. Stile and rail constructed of solid lumber as illustrated in AWS/AWI figure 9-039 Section A-A.

G. Panel Construction: Panels shall be 2-ply lumber raised panels as illustrated in AWS/AWI figure 9-040 Section A-A.

1. Horizontal grain direction for panels as illustrated in AWS/AWI figure 9-038.

D. Adhesives: Type 1 Waterproof adhesives for all doors.

E. Panel and Glass Retention: Solid lumber stops and moulding; material and finish to match stile and rail construction. Provide moulded stops as illustrated in AWS/AWI figure 9-041 Section A-A.

2.6 DOOR MATERIALS (INTERIOR DOORS) FACTORY FINISH (TRANSPARENT FINISH)

A. Material: Douglas Fir Vertical Grain to receive transparent finish.

C. Solid Lumber: AWS/AWI Section 6; Premium Grade. Lumber Grade I. Solid lumber to receive transparent finish to match doors. Factory Finish.

D. Provide Factory Finish conforming to AWS/AWI Section 5, System 11 - two-coat Catalyzed Polyurethane finish and Stain, Premium Grade. One-coat of Stain.

2.7 DOOR MATERIALS (EXTERIOR DOORS) FACTORY FINISH (TRANSPARENT FINISH)

A. Facing Quality: AWS/AWI Section 9; Premium Grade. Plain sliced, Grade AA veneer face; book matched leaves for transparent finish.

B Material: Douglas Fir Vertical Grain.

C. Solid Lumber: AWS/AWI Section 6; Premium Grade. Lumber Grade I. Solid lumber to receive transparent finish on interior surface of doors. Factory Finish.

D. Provide Factory Finish conforming to AWS/AWI Section 5, System 11 - two-coat Catalyzed Polyurethane finish and Stain, Premium Grade. One-coat of Stain.

2.8 DOOR MATERIALS (EXTERIOR DOORS) FIELD FINISHING (OPAQUE FINISH)

A. Solid Lumber: as noted in 2.06 above. Solid lumber to receive opaque finish on exterior and edges of doors. Factory primed and field Finish.

B. Field Finishing (Opaque Finish): Field paint as specified in Section 09 91 00.

2.9 FRAME CONSTRUCTION (INTERIOR DOORS)

A. Solid Lumber, Non-Rated Frames: AWS/AWI Section 6; Premium Grade. Lumber Grade I. Lumber species to match door material. Solid lumber to receive opaque finish. Field Finish. Field Finishing (Opaque Finish): Field paint as specified in Section 09 91 00.

B. General: Fabrication in accordance with AWS/AWI Section 6; Premium Grade quality standards.

2.10 FRAME CONSTRUCTION (EXTERIOR DOORS)

A. Solid Lumber, Non-Rated Frames: AWS/AWI Section 6; Premium Grade. Lumber Grade I. Lumber species to match door material. Solid lumber to receive opaque finish. Field Finish.

1. Field Finishing (Opaque Finish): Field paint as specified in Section 09 91 00.

B. General: Fabrication in accordance with AWS/AWI Section 6; Premium Grade quality standards.

2.11 FINISHING

A. Exterior Doors and Frames: Provide factory finish; transparent finish on interior surface, as specified in Section 08 14 33.

B. Exterior Door face, door edges and Frames: Provide factory finish primer ready to receive field finishing (Opaque Finish) as specified in Section 09 91 00.

C. Interior Doors: Provide factory finish; transparent finish as specified in Section 09 91 00.

D. Interior Frames: Provide factory finish primer ready to receive field finishing (Opaque Finish) as specified in Section 09 91 00.

2.12 GLAZING

A. Safety Glazing Type: Provide glazing in accordance with Section 08 81 00.

2.13 **ACCESSORIES**

A. Moulded Glass Stops: Solid lumber to match door and frame material and finish.

2.14 **FABRICATION**

A. Factory machine doors for finish hardware in accordance with hardware requirements and dimensions. Do not machine for surface hardware.

B. Door Frame Construction: Double rabbet style. Type 3 as illustrated in AWS/AWI figure 6-030. Minimal thickness of frame members as specified in AWS/AWI Section 6.

C. Factory fit doors for frame opening dimensions identified on shop drawings.

D. Cut and configure exterior door edge to receive recessed weather-stripping devices.

E. Provide edge clearances in accordance with AWS/AWI Section 9.

F. Coordinate with Section 08 71 00. Undercut doors as scheduled. Undercuts are measured from top of finish floor covering or threshold.

PART 3 - EXECUTION

3.1 **INSTALLATION**

A. Install doors and frames in accordance with AWS/AWI Premium Grade quality standards and manufacturer's instructions.

B. Trim door width by cutting equally on both jamb edges.

C. Trim door height by cutting bottom edges to a maximum of 5/8 inch.

E. Machine cut for hardware.

F. Coordinate installation of doors with installation of hardware specified in Section 08 71 00.

G. Coordinate installation of glass and glazing.

H. Install doors louvers plumb and level.

3.2 **INSTALLATION TOLERANCES**

A. Conform to AWS/AWI Premium Grade quality standard requirements for fit and clearance

tolerances.

3.3 **ADJUSTING**

A. Adjust door for smooth and balanced door movement.

END OF SECTION

SECTION 083100 - ACCESS DOORS AND PANELS

PART 1 - GENERAL

1.1 **QUALITY ASSURANCE**

A. Provide labels indicating rating.

1.2 **SUBMITTALS**

A. Submit product data under provisions of Section 01 33 00.

B. Include sizes, types, finishes, scheduled locations, and details of adjoining work.

1.3 **COLORS**

A. Colors are specified on Color and Materials Schedule on drawings.

PART 2 - PRODUCTS

2.1 **MANUFACTURERS**

A. Access Panel:

1. J.L. Industries

2. Substitutions: Under provisions of Section 01 60 00.

B. Locks:

1. Schlege Cylinder Lock.

2.2 **ACCESS PANEL**

A. Construction: Hinged lockable steel access door with 16-gauge frame and 14-gauge door, concealed hinge, lock, and adjustable anchor straps. Provide of steel construction with prime coated finish in other areas.

B. Sizes: as indicated in the documents.

C. Access door shall be keyed to the building key system.

2.3 MECHANICAL ACCESS DOORS

A. Meet requirements of this Section. Provide by Division 22 and Division 23.

2.4 FINISH

A. Prime coat with baked on primer.

B. Field paint per Section 09 91 00.

PART 3 - EXECUTION

3.1 INSPECTION

A. Verify rough openings for door and frame are correctly sized and located for coordination with access to concealed work and adjoining systems at access points.

B. Beginning of installation means acceptance of existing conditions.

C. Coordinate with Section 09 29 00 for gypsum wallboard.

3.2 INSTALLATION

A. Install frame plumb and level in openings.

B. Coordinate position to provide convenient access to concealed work requiring access.

C. Secure rigidly in place in accordance with manufacturer’s instructions.

END OF SECTION

SECTION 085269 - WOOD STORM WINDOWS

PART 1 - GENERAL

1.1 **SECTION INCLUDES**

A. Shop fabricated custom fitted wood storm with operating sash; shop glazed.

B. Operating hardware.

1.2 **REFERENCES**

A. ANSI/NWWDA IS-2 - Wood Windows.

B. ANSI/NWWDA IS-4 - Water Repellant Preservative Non-Pressure Treatment for Millwork.

C. AWI – Architectural Woodwork Institute, Quality Standards, current edition.

1.3 **PERFORMANCE REQUIREMENTS**

A. Limit member deflection to 1/200 with full recovery of glazing materials.

B. System to accommodate, without damage to components or deterioration of seals, movement between secondary storm window and primary window frame, deflection of lintel.

C. Drain water entering joints, condensation occurring in glazing or migrating moisture occurring within system, to the exterior by a weep drainage network.

1.4 **SUBMITTALS**

A. Submit under provisions of Section 01 33 00 - Submittal Procedures.

B. Shop Drawings: Indicate opening dimensions, framed opening tolerances, affected related work and installation requirements.

C. Product Data: Provide component dimensions, anchorage and fasteners and glass, internal drainage details.

D. Submit two (2) samples 12_x_12 in. in size illustrating window frame section muntin bar pre-finished surfaces, glass units.

E. Submit sample of operating hardware.

1.5 QUALIFICATIONS

A. Manufacturer and Installer*:* Company specializing in manufacturing wooden storm windows with minimum five (5) years*'* experience.

1.6 PRE-INSTALLATION CONFERENCE

A. Convene one (1) week prior to commencing work of this Section.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect, and handle products to site under provisions of Section 01 60 00 - Product Requirements.

B. Protect pre-finished surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond when exposed to sunlight or weather.

1.8 ENVIRONMENTAL REQUIREMENTS

A. Do not install sealants when ambient temperature is less than 40 degrees F degrees.

B. Maintain this minimum temperature during and after installation of sealants.

1.9 FIELD MEASUREMENTS

A. Verify that field measurements are as indicated on drawings for each opening and that the opening is square and plumb.

1.10 COLORS

A. Colors are specified on Color and Materials Schedule on drawings.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Wood: Clear Ponderosa Pine or Douglas fir species, clear preservative treated to ANSI/NWWDA IS-4 of type suitable for transparent or opaque exterior and interior finish. 5/4-inch-thick sash.

B. Fasteners: Stainless steel.

2.2 GLASS AND GLAZING MATERIALS

A. Glass and Glazing Materials: As specified in Section 08 81 00 – Glass Glazing, of Types described below:

1. Glass in Exterior Lights: Clear uninsulated double strength glass units.

2.3 SEALANT MATERIALS

A. Sealant and Backing Materials: As specified in Section 07 92 00 – Joint Sealants, of types described below.

2.4 HARDWARE

A. Manufacturer / Suppler:

1. Stanley – National
2. Wm A. Kilian Hardware Co.

B. Storm Sash Hangers, Heavy-Duty Stainless-Steel Storm Hanger, Killian, HD SS Kilian Hangers. Install two per window regardless of operation.

C. Storm Sash Adjusters (Operators/lock):: Stainless Steel, Kilian Stainless Steel Storm Window Adjusters, K40SS.

D. Pull: 4 inch, Brushed Nickel plate over solid brass. Killian, 1409-BN

E. Stainless Steel, one wing turnbutton, two (2) per fixed storm panel, Killian, SS Trunbutton.

2.5 FABRICATION

A. Fabricate framing sash members with slot mortise and tendon joints. Waterproof glue joints to hairline fit, weather tight.

B. Slope sill rail to match existing still

C. Fabricate components with minimum clearances and shim spacing around perimeter of assembly, yet enabling installation and free operation sash..

E. Arrange fasteners to conceal from view.

G. Weatherstrip operable units,1/4-inch kerf and bulb, all sides of sash.

H. Shop glaze window units.

2.6 FINISHES

A. Exterior Surfaces: Opaque as specified in Section 09 91 00 - Painting. Color to match adjacent window.

B. Hardware: Stainless Steel, unless noted otherwise

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify site opening conditions and size.

B. Verify wall openings and adjoining air and vapor seal materials are ready to receive work of this Section.

3.2 INSTALLATION

A. Install Storm window and hardware in accordance with manufacturer's instructions.

B. Install Storm window plumb and level, free of warp or twist. Maintain dimensional tolerances, aligning with adjacent work.

C. Install operating hardware.

3.3 ADJUSTING

A. Adjust work under provisions of Section 01 77 00 – Closeout Procedures.

B. Adjust operating hardware for smooth operation.

3.4 CLEANING

A. Clean work under provisions of 01 77 00 – Closeout Procedures.

B. Remove protective material from pre-finished surfaces.

C. Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.

END OF SECTION

SECTION 085990 - WOOD WINDOW & DOOR RESTORATION

PART 1 - GENERAL

1.1 REFERENCES

A. ASM C 741 (1993; R 1998) Accelerated Aging of Wood Sash Face Glazing Compound

B. ASTM C 742 (1999) Degree of Set for Wood Sash Glazing Compound

C. ASTM C 1184 (2000ael) Structural Silicone Sealants.

D. WWPA - Western Wood Products Association.

E. AWI – Architectural Woodwork Institute, Quality Standards, current edition.

F. National Park Service, Preservation Brief Number 9 “The repair of Historic Wooden Windows”

G. The Secretary of the Interior's Standards for Rehabilitation

1.2 SUBMITTALS

A. Submit under provisions of Section 01 33 00 – Submittal Procedures.

B. Product Data: Manufacturer’s installation instructions for each type of hardware and weather-stripping.

C. Shop drawings indicating replacement materials and profiles, and weather-stripping installation.

D. Samples

1. Hardware: representative sample of each type of hardware with identifying tags.

2. Moldings: a 6-inch long piece of each molding type required for each opening and casing with specified finish.

3. Weather-stripping: a 6-inch long sample of each type of weather-stripping required with fasteners.

E. Work Plan/Execution narrative: Descriptive narrative of restoration methods to be employed in the work. Narrative shall be organized in sequence from preparation through completion of the work. Schedule showing estimated time, in calendar days, for completion of each phase of the work shall be included. This narrative may be included as a portion of other Execution narrative or work plan.

1.3 QUALITY ASSURANCE

A. Qualifications Documentation: Submit to the Owner a list of similar restoration projects performed in the previous five (5) years, along with the names and telephone numbers of references familiar with the projects.

B. Qualifications Documentation: Submit the names of the supervisor/working foreman and all personnel performing work, their references and documented experience.

C. Lumber Grading: Certified by WWPA.

D. Perform work in accordance with AWS/AWI Premium Grade quality standards.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Store and protect products under provisions of Section 01 60 00 – Product Requirements.

B. Store in ventilated areas with constant minimum temperature of 60 degrees F and maximum relative humidity of 55 percent.

C. Materials shall be stored out of contact with the ground and under weather tight covering in a secure location. Historic material shall be labeled to identify the specific location from which they were removed.

1.5 COLORS

A. Colors are specified on Color and Materials Schedule on drawings.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Existing materials shall be reused whenever possible in the repair and rehabilitation of historic wood openings indicated to remain. This includes all wood elements, hardware, and historic glass. Replacement of opening elements with new materials shall be done only when original materials are so deteriorated as to prohibit their useful function.

2.2 WOOD

A. Wood used to replace deteriorated opening members shall be of the same species and grade as the original, unless otherwise noted. Each replacement piece shall be of solid stock, no finger-jointed and/or veneered stock shall be used.

2.3 GLASS AND GLAZING

A. Existing intact original glass shall be reused. Individual glass panes shall be reused in their original frames and positions. New glass and glazing materials shall conform to Section 08 81 00 – Glass Glazing.

2.4 WINDOW HARDWARE

A. Existing original hardware shall be reused when it is salvageable. Replacement hardware shall match original in design, material, and finish. Existing hardware is to be repaired to full operation if retained, cleaned and repainted if it had a painted finish originally.

B. Hardware Manufacturers:

1. Ives, Hanger, Stanley, WM A. Kilian, Schlage, Rejuvenation Hardware, Deltana or Approved.

2. For bidding purposes assume all sash lifts and cam locks will need to be replaced, two (2) lift per opening and one (1) locks per exterior opening, one (1) lock per interior opening; for eleven (11) exterior windows and three (3) interior transaction windows. Only the interior windows are counterweight balanced, with weights, pulleys, and chords. The exterior windows have one (1) existing window spring bolts pre sash, two (2) per window opening, assume each will need to be replaced with an additional spring bolt added to the upper sash on the opposite side from the original location. Sash Locks are to be installed uniformly to the right of the center vertical muntin bar.

   New hardware: US10B Oil Rubbed Bronze Finish, solid brass, unless noted otherwise.

   a. Window Pulls: Solid Brass, Forged Hook Type Sash Lift, 1 ¾ inch wide x 1 5/16 tall, 1 inch projection. Wm. A. Kilian Hardware Company. No. 23, or approved.

   b. Window Sash Lock, Cam Style Cast Solid Brass Cam Lock, 2-9/16-inch width, Wm. A. Kilian Hardware Company, Deltana No. WL07CR003, or approved.

   c. Window Spring Bolts: Brass, verify size but similar to Wm. A. Kilian Hardware Company. No. 8718, or approved.

2.5 FASTENERS

A. All Fasteners shall be stainless steel or brass.

2.6 GLAZING COMPOUND

A. Glazing compound for single pane glass shall be oil-based, non-staining and non-bleeding, and shall pass the test requirements of ASTM C 741, and ASTM C 742.

B. Sarco Dual Glaze or approved equal for existing window reglazing.

2.7 GLAZING POINTS

A. Glazing points shall be stainless steel or galvanized steel.

2.8 EPOXY CONSOLIDANTS

A. Refer to Section 09 99 50 – Repair and Preparation of Historic Wood Surfaces for Painting.

2.9 **ACCESSORIES**

A. Nails, Screws and Fasteners: Use stainless steel, corrosion resistant, type 316; non-staining, of size, length and strength to securely and rigidly retain the work.

B. Sheet Metal Flashing and Trim: As specified in Section 07 62 00 – Sheet Metal Flashing and Trim.

PART 3 - EXECUTION

3.1 **EXAMINATION**

A. The Contractor shall carefully remove window sash and doors from each opening for shop restoration. Openings to be temporarily infilled with plastic sheeting and plywood to secure building during restoration work. Repair wood window and door openings as indicated; reinstall restored sash and doors in their previous location. Adjust windows and doors to proper operation and sound condition. Existing paint finish is to be full removed, the woodwork repaired and refinished.

3.2 **EVALUATION SURVEY**

A. A complete evaluation survey of the existing conditions of each window and door opening, both exterior and interior, shall be made to determine the extent of repairs necessary. The evaluation survey may be in the form of a schedule and shall note at a minimum:

1. Opening location
2. Condition of the paint
3. Condition of the frame and sill
4. Condition of the interior and exterior trim
5. Condition of the sash (including rails, stiles, and muntins)
6. Glazing problems
7. Opening hardware and operating system
8. The overall condition of the opening

3.3 **REPAIRS**

A. Example Opening:

1. Select an existing Window and Door opening to serve as an example (mockup). The mockup shall serve as an example of the quality of repairs to be provided and shall be reviewed and approved by the Project Representative before proceeding with the remainder of the window and door restoration work.

B. Sash removal:

1. The interior stops shall be removed first in a method so as not to scar the wood and prevent the reuse of stops.

2. Connecting hardware and operating mechanisms shall then be detached and the sash shall be removed from the frame.

3. Removed sashes and trim shall be identified as to location to assure reinstallation in their original positions.

4. Windows with counter-weight systems, if encountered, shall have the sash cords detached from the sides of the sash and their ends pinned with a nail or tied in a knot to prevent them from falling in the weight pocket; the lower sash can then be removed.

5. The parting bead shall be removed so as to not scar the wood and prevent the reuse of parting bead.

6. Plastic covering and plywood shall be installed to provide a watertight and secure cover at each opening during repairs.

7. All Openings shall be full secured when contractor is not on site.

C. Door removal:

1. Remove door from opening in a method so as to protect the door and frame from further damage.

2. Removed doors shall be identified as to location to assure reinstallation in their original positions.

3. Plastic covering and plywood shall be installed to provide a watertight and secure cover at each opening during repairs.

4. All Openings shall be full secured when contractor is not on site.

5. Doors scheduled for replacement shall be properly tagged to note their former location and turned over to the owner for storage and future reference.

D. Paint Removal:

1. All paint shall be removed to bare wood using non-destructive means such as a chemical stripper or heat gun.

2. If chemical strippers are used, wood shall be neutralized after stripping to a litmus pH of 5 to 8.5 and the glass shall be protected from damage.

3. Wood shall be allowed to dry to a moisture content of 8 to 12 percent before repainting.

4. If heat methods are used for paint removal, glass shall be protected from sudden temperature change to avoid breakage.

5. Wood Repair:

   a. Badly decayed areas (with more than 30 percent wood decayed) shall be removed from wood sash, doors, sill, frame, and trim assembles.

   b. Moderately decayed areas (less than 30 percent decayed), weathered, or gouged wood shall be patched with approved patching compounds and shall be sanded smooth. Intact sash rails and stiles that are loose shall be repaired with new dowels to make joints tight.

E. Epoxy Wood Repair:

1. Epoxy liquid wood consolident shall be used to penetrate and impregnate deteriorated wood sections to reinforce wood fibers that have become softened or absorbent.

2. Epoxy paste shall be used to fill areas where portions of wood are missing such as holes, cracks, gaps, gouges, and other voids. Areas to receive epoxy paste patching material shall be primed with compatible epoxy liquid wood consolident or a primer recommended by the manufacturer.

F. Wood replacement:

1. Wood decayed beyond repair shall be replaced with new pieces that match originals in all respects. Joinery shall match that of existing. Muntins shall have coped mortise and tenon joints. Molded members shall have mitered or coped joints.

G. Hardware:

3. Existing window door hardware shall be reused unless otherwise noted. Existing hardware shall be stripped of paint down to bare metal, replate hardware with brass finish. New hardware shall be installed where original is missing, damaged, or unsuitable for new operation, per manufacturer's directions to provide a secure and smoothly operating opening assembly. New hardware to match original in form and finish.

4. Replace missing hardware with identical items from new stock if possible. If part of a hardware set is missing from several windows combine the portions of the hardware to create a complete set on a single individual window. On windows missing complete hardware sets use a new hardware matching original hardware sets.

5. Existing hardware not reused in the project shall be turned over to the owner properly tagged as to the former location.

H. Glazing:

1. Existing lights shall be reused. Lights to be reused shall be reinstalled in their original frames and positions. Rabbeted integral glazing recesses shall be brushed with quick dry shellac prior to the application of bed glazing compound. Broken glass shall be replaced.

I. Operating System:

1. Windows with Spring Bolts

   a. Retore window to original operating condition, retore existing spring bolts, replace damaged spring bolts in pairs. (Typical Exterior Window)

2. Windows with counter-weight systems shall be repairs to original operating function. (Interior Transaction Windows)

   a. Original sash weights and pulley system shall be reused wherever possible.

   b. Missing weights and sash cords shall be replaced.

   c. Sash cords shall be replaced with new cotton cords rated for sash weight. Red dot sash cord or approved.

   d. When new weights are required, they shall match the originals in weight and size.

   e. Replacement weights shall be cast iron.

3. Weather-stripping shall be installed on all operable windows.

4. Weather-stripping shall consist of bronze, compression or interlocking weather strips designed for permanent sealing under bumper or wiper action. Interlocking double hung window weatherstrip, Wm. A. Kilian Hardware Company or approved.

5. Weather-stripping shall be provided at the perimeter of each sash including meeting rails and shall be installed per manufacturer’s instructions.

6. Weather-stripping shall be completely concealed when sash is closed.

3.4 PAINTING PREPARATION

A. Refer to Section 09 99 50 – Repair and Preparation of Historic Wood Surfaces for Painting.

3.5 PAINTING

A. Coordinate with Section 09 91 00 – Painting, for priming front and back faces, edges, and ends after cutting and prior to installation.

3.6 REASSEMBLY

A. After repairs are completed, the opening shall be reassembled with all parts tight, true and functioning properly. Wood surfaces shall be free of blemishes.

3.7 ADJUSTMENTS

A. Final adjustment for proper operation of doors and ventilating window units shall be made after reassembly. Adjustments shall be made to doors, operating sash to assure smooth operation and weather tight performance when locked closed.

3.8 CLEANING

A. Window and door openings shall be cleaned on both the exterior and the interior

END OF SECTION

SECTION 087100 - DOOR HARDWARE

PART 1 - GENERAL

1.1 **REFERENCES**

A. ANSI/BHMA – A156 Series Standards

1.2 **SCOPE**

A. Work under this Section includes the complete finish hardware requirements for the project. Items not specifically mentioned but necessary to complete the work shall be furnished, matching the items specified in quality and finish.

1.3 **QUALITY CONTROL**

A. Supplier: Finish hardware shall be supplied by a factory authorized builder's hardware distributor for products as specified or approved and who has been furnishing hardware in the same area as the project for a period of not less than two (2) years. The supplier's organization shall include a member of the American Society of Architectural Hardware Consultants who is available at all reasonable times during the course of work to meet with the Project Representative for project hardware consultation.

B. Installer: Finish hardware shall be installed only by experienced tradesmen, either at the door and frame fabrication plant or at the project site.

C. Codes:

1. All finish hardware shall comply with applicable local and/or current building codes.

2. Provide hardware that meets or exceeds handicap accessibility per local building codes. Conform to the Americans with Disabilities Act (ADA) Accessibility Guidelines.

3. Lever handle locks and latches to have levers return within 1/2 in. of the face of the door.

4. Knobs or handles or other operating hardware on doors leading to loading platforms, stages, mechanical equipment rooms or other areas hazardous to the blind shall be knurled or otherwise rough to the touch.

5. Closer adjustment shall not exceed the following opening force:

a. Interior doors - 5 pounds pressure.

b. Exterior doors - 10 pounds pressure.

1.4 SUBMITTALS

A. Product Data: Submit one (1) copy of manufacturer's data for each item of finish hardware along with hardware schedules submitted. Data to be used to assist Project Representative in reviewing schedule.

B. Samples: If requested by the Project Representative, submit one (1) sample of each exposed hardware category, finished as required, and tagged with full description for coordination with the hardware schedule. Samples will be reviewed by the Project Representative for design and finish only, and compliance with other requirements is the responsibility of the Contractor. Units that are acceptable and remain undamaged through submittal procedures may be used on the project.

C. Hardware Schedule:

1. At the earliest possible date, submit two (2) hard copies along with a pdf electronic copy of the finish hardware schedule, organized into "hardware sets" and indicating complete designation of every item required for each door opening. Each door must have a complete hardware set for that door. No multiple doors or headings using a "typical" hardware set will be approved. Approval of the hardware schedule does not relieve the Contractor of the responsibility to fulfill the project requirements in accordance with the Contract Documents.

2. Submit a keying schedule in accordance with the instructions from the Project Representative.

3. After the schedules have been approved by the Project Representative, submit two (2) copies of the corrected schedules to the Contractor for use and distribution. One additional copy plus catalog cuts of each item and installation and maintenance instructions shall be sent to:

4. Format for Schedule (Sample Only):

HEADING 101 - HW1

ONE SGL DOOR 101 CORRIDOR FROM OFFICE 101 LHR 90
3 ft 0 in. X 7 ft 0 in. X 1-3/4 WD X HM 20 Min

1-1/2 PR. Butts	BB1279 652 4-1/2 X 4-1/2
1 Lockset	35H7J14C
1 Closer	4111 EDA
1 Kickplate	#285 - 10 X 34 - COLOR
1 Wall Bumper	W9 626
3 Silencers	64

5. Templates: Furnish approved hardware schedule and templates for each fabricator of doors, frames, and other work to be factory prepared for the installation of hardware. Upon request, check the shop drawings of such other work to confirm that adequate provisions will be made for the proper installation of hardware.

1.5 PRODUCT HANDLING AND STORAGE

A. Packaging: Each item or package is to be separately tagged with identification related to the final hardware schedule. Basic installation instructions shall be included in the packages.

B. Storage: The General Contractor shall provide a locked room at the jobsite for the storage of hardware.

1.6 GUARANTEE

A. Unless otherwise stated, Finish Hardware shall carry a limited warranty against defects in material, workmanship, and operation for a period of at least one (1) year, backed by a factory warranty of the hardware manufacturer, except the door closers shall have a minimum ten (10) year warranty. Exit devices shall have a minimum five (5) year warranty.

1.7 SUBSTITUTIONS

A. Substitutions under provisions of Section 01 60 00 Product Requirements.

1.8 COLORS

A. Colors are specified on Color and Materials Schedule on drawings.

PART 2 - PRODUCTS

2.1 KEYING

A. All cylinders shall be keyed to match Owners Master Key System. Permanent keying shall be as directed by the Project Representative. All cylinders shall be provided with removable cores.

B. All cylinders shall be construction keyed and the Contractor provided six (6) construction keys.

C. All keys shall be stamped "DO NOT DUPLICATE".

D. Furnish:

4 Master Keys
2 Keys each keyed lock, 6 keys each KA group.

2.2 FINISH

A. Exposed surfaces of all door hardware shall be US10B Oil Rubbed Bronze Finish unless otherwise stated in this finish hardware specification.

C. Surface door closers to be sprayed to match adjacent hardware.

2.3 MATERIALS

A. The use of hardware manufacturer's product numbers and designs is for the purpose of identifying type, function and quality. Request for permission to bid other products of the same type, function and quality is to be made in accordance with instructions described in Section 1.06 Substitutions. All hardware is to be ANSI/BHMA Grade 1, unless specified otherwise.

B. Butt Hinges:

1. Manufacturer Listed: Hager.

2. Acceptable Substitutions: Bommer, McKinney.

3. Sizes: Unless specified in the hardware groups differently hinge height to be:

   a. 4-1/2 inch for doors 1-3/4 inch thick and up to 36 inch in width.
   b. 5 inch for Exterior doors and doors 1-3/4 inch thick, over 36 inch in width.

4. Quantity: 1-1/2 pair up to and including 90 in. in height. For doors over 90 in. in height, supply one (1) additional butt for each additional 30 in. in height, or fraction thereof.

5. For unusual size or weight doors, furnish type, size and quantity recommended by the butt manufacturer.

6. All exterior and interior reverse bevel locked doors to have non-removable pins (NRP set screw in barrel).

7. Exterior hinges solid brass with stainless pins and brass ball tip pins.

8. Interior hinges steel hinges with finish plating as noted. ball tip pins.

C. Spring Hinges:

1. Manufacturer: Hager.

2. Acceptable Substitution: Bommer, McKinley.

D. Lockset:

1. Manufacturer Listed: Schlage Commercial Grade 1, Heavy Duty, L Series

2. Acceptable Substitutions : Sargent, Yale, Corbin Russwin

3. Heavy Duty Mortise Locksets.:

   a. Basis of Design: Schlage L Series, ANSI/BHMA Grade 1

   b. Design: Lever handle, 03 (Tubular) style, 'N' Full Escucheons (Exterior Doors), '6A' rose (Interior Doors)

   c. Strike: 16 gage curved lip strike sufficient length to clear trim, with 1" deep box construction.

4. Standalone Programmable Electronic Keypad Lockset

   a. Basis of Design : Schlage CO-100

   b. Finish : Aged Bronze

E.. Door Closers:

1. Manufacturer Listed: LCN.

2. Acceptable Substitutions: Sargent, Yale, Corbin-Russwin, Norton.

3. Door Closers to meet ADA requirements for maximum door-opening force in accordance with ICC A117.1 Section 404.2.8 (Washington State Amendment – IBC Section 1101.2.3). Other than fire doors; exterior hinged doors of 10.0 lbs maximum and interior hinged doors of 5 lbs maximum force for pushing or pulling.

4. Door Closers to meet ADA requirements for closing speed in accordance with ICC A117.1 Section 404.2.7. Door closers shall be adjusted so that from an open position of 90 degrees, the time required to move the door to an open position of 12 degrees shall be 5 seconds minimum.

5. Size as recommended by manufacturer.

6. Spray closers to match adjacent door color.

7. Whether specified or not, provide the proper feet to suit the conditions and the proper length arm to allow fullest degree of opening allowed by wall conditions.

8. Provide drop plates where required.

9. Contractor shall install all the screws required for the foot.

10. Provide special closer mounting as required where interference with weatherstrip or sound seal occurs.

11. Door closer foot brackets shall be rabbet applied where soffit width is not wide enough to clear the door seal.

12. Door closers to carry a ten (10) year warranty against defects, material, and workmanship.

F. Stops and Holders:

1. Manufacturer Listed: Trimco/BBW, CRL, RBA Door.

2. Acceptable Substitutions : Hager, Ives, RBA Door, CRL.

3. There shall be stops to protect all walls, cabinet work or hardware operation. Wall stops shall be used wherever possible, unless otherwise called for in the hardware types. Where floor stops are used, they shall be installed no farther than 8 in. from the latch edge of the door.

G.. Kick Plates:

1. Manufacturer Listed: Trimco/BBW.

2. Acceptable Substitutions: Hager, Ives.

3. Material: K0064, Kick plate, Brass – Oil Rubbed Bronze Finish

4. Plates shall be mounted with trusshead screws of matching finish.

5. Sizes: All plates shall be furnished with width 1-1/2 inch less than door width except pairs of doors without mullions shall be 1 inch less than door width. The height shall be 10 inch or as specified in the detailed hardware list.

6. Where door seal, sound seal or weatherstrip is installed on the jamb stop, adjust kick plate width to allow 1/8 inch - 1/4 inch clearance each side.

7. Where kick plate width will interfere with installation of other hardware adjust width for proper clearance.

H. Weatherstrip:

1. Manufacturer Listed: Pemko.

2. Acceptable Substitutions: Hager, National Guard, Zero International.

3. Where it occurs, weatherstrip shall be applied to both sides of meeting stiles.

4. Door seal shall be adjusted to allow closing and latching of the door without slamming.

5. Air Leakage: Weatherstrip shall limit air leakage of exterior doors to a maximum rate of 0.2 cfm/sf of assembly area, when tested in accordance with NFRC 400 or AAMA/WDMA/CSA101/I.S.2/A440 at a differential pressure of 1.57 psf (75 Pa). Alternatively, the maximum air leakage rate shall be 0.3 cfm/sf of assembly area when tested at a differential pressure of 6.24 psf (300 Pa).

I. Door Silencers:

1. Manufacturer Listed: Trimco/BBW.

2. Acceptable Substitutions: Hager, Glynn Johnson.

3. Quantity: Provide three (3) for each single doorframe and four (4) for each double doorframe on interior doors where gasketing is not provided.

4. W08 for Wood Frames.

J. Hasps & Padlocks:

1. Manufacturer Listed: Master Lock.

2. Acceptable Substitutions: Yale.

3. Heavy Duty, zinc plated hardened steel, Padlock Eye painted black, mounted on interior of door (Freight room side). Arranged to lock doors closed and in the open position. Master Lock 60 & 60R.

4. Heavy Duty padlock, one per sliding Frieght door, all five keyed to same master key. Model No. 37KA Stainless steel.

K. Door Pull:

Manufacturer: Richards-Wilcox Inc.
Design: 8 inch long, Bow Handle, Part No. 0081.00002, (1) per Freight door,.
1. Black Powder Coated Finish

K. Cane Bolt

1. Manufacturer: Richards-Wilcox Inc.
Design: 18” Heavy Duty Cane Bolt, Part No. 0524.00021BZC, (1) per Freight door.

2. Black Zinc Plated Finish

L. Threshold Entry Ramp

1. Manufacturer: Pemko
2. Finish: Black recycled rubber.
3. Width of door and trim min.

2.4 HARDWARE GROUPS

HW-1 (Single Exterior Outward Swinging Entry Doors 101 & 104A)

3	EA	Hinges	BB1191
1	EA	Programmable Keypad Lockset	CO-100
1	EA	Closure / Overhead stop	4110
1	EA	Threshold	255
2	EA	Kickplate	K064
1	EA	Door Sweep	29326
1	EA	Weather Striping	PK55D
1	EA	Threshold Entry Ramp	RR1.25FMR Series

HW-2 (Single Interior Inward Swinging Restroom Doors 105 & 106)

2	EA	Spring Hinge	BB5052
1	EA	Lockset	L9040
1	EA	Standard Restroom Indicator (outside)	L9050P
2	EA	Kickplate	K064

* Satin Stainless Steel on Restoom side of door.

HW-3 (Single Swinging Office Doors 102A & 104B)

2	EA	Hinges	BB1191
1	EA	Lockset	L9071
1	EA	Closure / Overhead stop	4110
2	EA	Kickplate	K064
1	EA	Door Sweep	29326
1	EA	Weather Striping	PK55D

HW-4 (Single Swinging Office Door 102B)

2	EA	Hinges	BB1191

1	EA	Lockset	L9071
1	EA	Closure / Overhead stop	4110
2	EA	Kickplate	K064

HW-5 (Single Outward Swinging Storage Door 103C)

2	EA	Hinges	BB1191
1	EA	Lockset	L9080
1	EA	Door Sweep	29326
1	EA	Weather Striping	PK55D

HW-6 (Historic Freight Room Sliding Doors 103A & 103B)

1	EA	Threshold	255
1	EA	Door Sweep	18137
1	EA	Door Pull, interior of door.	
1	EA	Hasp and Padlock, to be install on interior of doors.	
1	EA	Cane Bolt	
1	EA	Refinish and reuse existing and hardware.	

PART 3 – EXECUTION

3.1 **PREPARATION**

A. Provide solid blocking for all wall stops and bumpers.

B. Fasteners: Check all conditions and use fastening devices as needed to secure or anchor all hardware as per manufacturer's published templates. Self-tapping sheet metal screws are not acceptable. All closers and exit devices on wood doors shall be thru-bolted. The Contractor shall be responsible for drilling wood or metal with the recommended hole sizes.

3.2 **INSTALLATION**

A. The General Contractor shall be responsible for proper installation and operation of hardware in locations specified. Door closers shall in stalled and adjusted to close and latch the door without slamming.

B. The General Contractor shall protect exposed hardware surfaces during construction period from damage to products and finishes.

C. In the absence of other hardware installation requirements in this Section or indicated, the following recommendations shall be used as a guide:

1. Top Hinge: 5-inch, header rabbet to top of hinge.

2. Bottom Hinge: 10-inch, finish floor to bottom of hinge.

3. Center Hinge: Centered between top and bottom hinges.

4. Mortise Locks: 40 5/16-inch, finish floor to center of lock case and strike.

5. Deadlocks and Dead latches: 48-inch, finish floor to center of cylinder.

6. Exit Devices: 38-inch, finish floor to center of cross bar.

7. Push Plates: 45-inch, finish floor to center of plate.

8. Door Pulls: 42-inch, finish floor to center of pull.

D. All other hardware shall be installed as recommended by the manufacturer.

3.3 ADJUSTMENT

A. Adjust and check each operating item of hardware at each door to ensure proper operation or function of every unit.

B. Clean adjacent surfaces soiled by hardware installation and/or adjustment.

C. Whenever hardware installation is made more than one (1) month prior to acceptance or occupancy, make a final check and adjustment of all hardware items during the week prior to acceptance or occupancy. Clean and lubricate operating items necessary to restore proper function and finish of hardware.

D. Adjust door control devices to compensate for final operation for heating and ventilating equipment.

E. Instruct Owner's personnel in proper operation and maintenance of hardware and hardware finishes.

F. Replace units which cannot be adjusted to operate properly.

END OF SECTION

SECTION 088100 - GLASS GLAZING

PART 1 - GENERAL

1.1 **REFERENCES**

A. ASM C 741 (1993; R 1998) Accelerated Aging of Wood Sash Face Glazing Compound

B. ASTM C 742 (1999) Degree of Set for Wood Sash Glazing Compound

C. ASTM C1036 - Standard Specification for Flat Glass.

B. ASTM C1048 – Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass.

D. ASTM E774 - Sealed Insulating Glass Units.

E. IBC – International Building Code.

F. SIGMA - Sealed Insulated Glass Manufacturers Association.

G. FGMA - Glazing Manual and Glazing Sealing Systems Manual.

H. U.S. Consumer Product Safety Commission Standard 16 CFR 1201.

I. National Fenestration Rating Council (NFRC) Certification.

1.2 **QUALITY ASSURANCE**

A. Conform to Flat Glass Marketing Association (FGMA) Glazing Manual and Glazing Sealing Systems Manual and SIGMA for glazing installation methods.

B. Insulating glass unit shall be manufactured by a SIGMA member.

C. Provide safety glazing where required by IBC Section 2406.

1.3 **SUBMITTALS**

A. Submit product data and samples under provisions of Section 01 33 00 – Submittal Procedures.

B. Product Data: Provide manufacturer's product description for each type of glass and product specified.

C. Samples: Submit two 12-inch x 12 inch samples of each glass type specified. Identify glass manufacturer and glass type clearly on each sample.

1.4 DELIVERY, STORAGE AND PROTECTION

A. Protect glass materials during delivery, storage, and handling to comply with manufacturer's direction and as required to prevent edge damage.

1.5 WARRANTY

A. Replace any units failing to comply at no additional cost to the Owner within 45 days after receipt of written notice.

1.6 COLORS

A. Colors are specified on Color and Materials Schedule on drawings.

PART 2 - PRODUCTS

2.1 ACCEPTABLE GLASS MANUFACTURERS

A. Manufacturers listed:

1. PPG Industries

2. Technical Glass Products (Fire-Rated Safety Glass)

B. The following manufacturers may provide products equal to products specified.

1. Pilkington.

2. Guardian Glass - Guardian Industries Corporation.

C. Substitutions: Under provisions of Section 01 60 00 – Product Requirements.

2.2 GLASS MATERIALS & TYPES

A. General: Existing materials shall be reused whenever possible in the repair and rehabilitation of historic wood openings indicated to remain. This includes all wood elements, hardware, and glazing that are determined to be of historic significance. Replacement of opening elements with new materials shall be done only when original materials are so deteriorated as to prohibit their useful function.

B. Float Glass: ASTM C1036; Type I, Class 1, clear; 1/8-inch-thick minimum. (GL-01)

C. Safety Glass: ASTM C1048; Fully tempered with horizontal tempering conforming to CPSC 16 CFR 1201, labeled in accordance with IBC requirements. Provide permanent etched mark on corner of each panel indicating safety glass. Provide in clear, and mirror glass types. Glazing shall comply with CPSC 16 CFR 1201 Category I for lights 9 square feet or less and Category II for all lights over 9 square feet and all lights in sliding glass patio doors and doors to showers, tubs, hot tubs, saunas and steam rooms. Use for

Glazing Type: (GL-02).

E. Mirror Glass: Clear fully tempered safety glass with copper and silver coating; organic over coating, edges ground smooth. Use for Glazing Type: (GL-04).

F. Insulating Glass Units (Clear Glass): ASTM E774, double pane hermetically sealed unit; 5/8-inch glazing unit with 3/8-inch air space filled with Argon Gas and two 1/8-inch glass panes; conform to SIGMA Specifications, five (5) year minimum warranty. Low-E coating on insulating unit to side #2 for Visible Light Transmittance of 70%. U-Value = 0.26 for winter. Solar Heat Gain Coefficient of SHGC = 0.39. Vitro Architectural Glass Solarban 60 (2) Clear + Clear (Argon Gas) or equal. Float glass and fully tempered safety glass. Aluminum spacer to be clear anodized. SHGC and U-value: Use for Glazing Type: (GL-05).

2.3 GLAZING ACCESSORIES

A. Glazing compound for single pane glass shall be oil-based, non-staining and non-bleeding, and shall pass the test requirements of ASTM C 741, and ASTM C 742. Existing insulated glass units shall be reglazed with silicone sealant complying with ASTM C 1184 and shall be compatible with the unit seal on the glass unit.

B. Sarco Dual Glaze or approved glazing compound at existing historic windows.

C. Glazing points: Glazing points shall be stainless steel or galvanized steel.

D. Silicone Sealant: ASTM C920; Class A; single component; solvent curing; capable of water immersion without loss of properties; cured Shore A hardness of 15-25; stock color selected by Design Consultant.

PART 3 - EXECUTION

3.1 INSPECTION

A. Verify surfaces of glazing channels or recesses are clean, free of obstructions, and ready to receive glazing.

B. Beginning of installation means acceptance of substrate.

3.2 PREPARATION

A. Clean contact surfaces with solvent and wipe dry.

B. Seal porous glazing channels or recesses.

C. Prime surfaces scheduled to receive sealant.

3.3 EXTERIOR GLAZING - WET METHOD (Glazing Compound)

A. Install glazing per glazing compound manufacturer's recommendations.

3.4 CURE, PROTECTION AND CLEANING

A. Protect exterior glass from breakage immediately upon installation by use of crossed streamers attached to framing and held away from glass. Do not apply markers to surfaces of glass. Remove nonpermanent labels and clean surfaces. Cure sealants for high early strength and durability.

B. Remove and replace glass which is broken, chipped, cracked, abraded, or damaged in other ways during construction period, including natural causes, accidents, and vandalism.

C. Wash and polish glass on both faces not more than four (4) days prior to date scheduled for inspections intended to establish date of completion in each area of project. Comply with glass product manufacturer's recommendations for final cleaning.

END OF SECTION

SECTION 092900 - GYPSUM BOARD

PART 1 - GENERAL

1.1 **REFERENCES**

A. ANSI A118.9 – Test Method and Specifications for Cementitious Backer Units

B. ASTM C475 - Joint Treatment Materials for Gypsum Wallboard Construction.

C. ASTM C557 - Adhesive for Fastening Gypsum Wallboard to Wood Framing.

D. ASTM C645 – Non-structural steel framing members.

E. ASTM C665 - Mineral Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.

F. ASTM C754 - Installation of Framing Members to Receive Screw Attached Gypsum Panel Products.

G. ASTM C840 - Application and Finishing of Gypsum Board.

H. ASTM C1002 – Steel Self Piercing Tapping Screws for the application of Gypsum Panel Products, metal plaster bases to wood or steel studs.

I. ASTM C1278 – Standard Specification for Fiber Reinforced Gypsum Panel.

J. ASTM C1396 – Standard Specification for Gypsum Board.

K. ASTM E119 - Fire Tests of Building Construction and Materials.

L. GA-214 – Recommended Levels of Gypsum Board Finish.

M. GA-216 - Recommended Specifications for the Application and Finishing of Gypsum Board.

N. GA-600 - Fire Resistance Design Manual.

O. NWCB – Northwest Wall and Ceiling Bureau Technical Library.

1.2 **SUBMITTALS**

A. Shop Drawings: Show locations, fabrication, and installation of control and expansion joints including plans, elevations, sections, details of components, and attachments to other units of work.

B. Product Data: Provide manufacturer's product information for each product specified.

1.3 QUALITY ASSURANCE

A. Applicator: Company specializing in performing the work of this Section with minimum five (5) years experience.

1.4 REGULATORY REQUIREMENTS

A. Conform to applicable code for fire rated assemblies.

1.5 DELIVERY, STORAGE, AND PROTECTION

A. Deliver materials in original packages, containers or bundles bearing brand name and identification of manufacturer or supplier.

B. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic and other causes. Neatly stack gypsum boards flat to prevent sagging.

C. Handle gypsum boards to prevent damage to edges, ends and surfaces. Do not bend or otherwise damage metal corner beads and/or trims.

D. Steel framing and related accessories shall be stored and handled in accordance with AISI's "Code of Standard Practice".

PART 2 - PRODUCTS

2.1 GYPSUM BOARD MATERIALS

A. Acceptable Manufacturers: The design is based on the specified products of the United States Gypsum Company, LLC. Subject to compliance with project requirements, other acceptable manufacturers are Georgia-Pacific Gypsum, Certainteed Gypsum and National Gypsum.

B. Gypsum Wallboard (Mold & Moisture Resistant): ASTM C1396; fire resistive type, 5/8-inch thick, maximum permissible length; ends square cut, tapered and beveled edges. USG SHEETROCK Mold Tough, Firecode X.

C. Cementitious Backer Board (CBB): ANSI A118.9; 5/8-inch thick; cementitious backer board. Moisture resistant, Mold resistant. Product: USG DUROCK Glass-Mat Tile Backerboard.

D. Substitutions: Under provisions of Section 01 60 00 - Product Procedures.

2.2 ACCESSORIES

A. Provide manufacturer's standard trim accessories for gypsum board work, per ASTM C 1047. Provide with either knurled or perforated expanded flanges for nailing or stapling, and beaded for concealment of flanges, in joint compound.

B. Fasteners: ASTM C1002 Buglehead screws, length as recommended by U.S. Gypsum Handbook, required for penetration into framing members.

C. Acoustical Sealant: Non-hardening, non-skinning, for use in conjunction with gypsum board.

D. Corner Beads: Metal.

E. Edge Trim: GA 216; Type LC, L, LK bead.

F. Joint Materials: GA 216; reinforcing tape, joint compound, adhesive, and water.

G. Control Joint: GA 216; roll-formed zinc control joint with removable strip, similar to USG No. 093 or ClarkDietrich™ 093 Control Joint.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that site conditions are ready to receive work.

3.2 GYPSUM BOARD INSTALLATION

A. Install gypsum board in accordance with GA 216, and GA 600.

B. Single Layer Applications: Erect single layer board horizontal, perpendicular to framing with ends and edges occurring over firm bearing.

C. Multiple Layer Applications: Offset joints of successive layers from joints of preceding layers; conform to requirements of fire-rated horizontal assemblies utilized.

D. Use screws when fastening gypsum board to wood furring or framing.

E. Treat cut edges and holes in moisture resistant gypsum board and exterior gypsum soffit board with sealant.

F. Place corner beads at external corners. Use longest practical length. Place edge trim where gypsum board abuts dissimilar materials.

G. Apply gypsum board to curved walls in accordance with GA-216.

3.3 JOINT TREATMENT

A. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.

B. Feather coats onto adjoining surfaces so that camber is maximum 1/32 in.

C. Seal gypsum wallboard prior to texturing in accordance with manufacturer's instructions.

D. Apply one (1) coat tape system (fire tape) at walls and ceilings exposed in attic and attic mechanical rooms.

3.4 **LEVELS OF FINISH** (per GA-214)

A. Finish Texture: Smooth Finish

B. Level 1 Concealed Areas:

1. All joints and interior angles shall have tape embedded in joint compound. Surface shall be free of excess joint compound. Tool marks and ridges are acceptable.

C. Level 2 Backer board:

1. All joints and interior angles shall have tape embedded in joint compound, leaving a thin coating of joint compound over all joints and interior angles. Fastener heads and accessories shall be covered with a coat of joint compound. Surface shall be free of excess joint compound. Tool marks and ridges are acceptable.

D. Level 3 Exposed Storage Rooms and Mech./Elect. Spaces:

1. All joints and interior angles shall have tape embedded in joint compound and two (2) separate coats of joint compound applied over all joints, angles, fastener heads, and accessories. All joint compounds shall be smooth and free of tool marks and ridges.

E. Level 4 Areas Exposed to the public including Offices & Toilet Rooms:

1. All joints and interior angles shall have tape embedded in joint compound and three (3) separate coats of joint compound applied over all joints, angles, fastener heads, and accessories. All joint compounds shall be smooth and free of tool marks and ridges.

3.5 **TOLERANCES**

A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 in. in 10 ft in any direction.

END OF SECTION

SECTION 093000 -TILING

PART 1 – GENERAL

1.1 **REFERENCES**

A. ANSI A108.1A – Installation of Ceramic Tile in Wet-Set Method, with Portland Cement Mortar.

B. ANSI A108.1B – Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set or Latex Portland Cement Mortar.

C. ANSI A108.5 - Installation of Ceramic Tile with Dry-Set Portland Cement Mortar or Latex Portland Cement Mortar.

D. ANSI A108.10 - Installation of Grout in Tile Work.

E. ANSI A118.1 - Dry-Set Portland Cement Mortar.

F. ANSI A118.3 – Chemical Resistant, Water-Cleanable, Tile-Setting and Grouting Epoxy.

G. ANSI A118.4 – Modified Dry-Set Cement Mortar.

H. ANSI A118.6 – Standard Cement Grouts for Tile Installations

I. ANSI A118.7 – High Performance Cement Grouts for Tile Installation.

J. ANSI A137.1 - Standard Specifications for Ceramic Tile.

K. TCNA (Tile Council of North America) - Handbook for Ceramic Tile Installation.

1.2 **SUBMITTALS**

A. Submit under provisions of Section 01 30 00 Submittal Procedures.

B. Product Data: Provide instructions for using mortars and grouts.

C. Samples: Mount tile and apply grout on one plywood panels, 12 x 12 inch size illustrating pattern, color variations, and grout joint size variations.

D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements ANSI A137.1.

1.3 **MAINTENANCE DATA**

A. Maintenance Data: Include recommended cleaning methods, cleaning materials, stain removal methods, and polishes and waxes.

1.4 QUALITY ASSURANCE

A. Conform to TCNA Handbook.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the products specified in this Section with minimum five (5) years' experience.

B. Installer: Company specializing in performing the work of this Section with minimum five (5) years' experience.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect, and handle products to site under provisions of Section 01600 Product Requirements.

B. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Do not install adhesives in an unventilated environment.

B. Maintain manufacturer's recommended temperature during installation of mortar materials.

1.8 EXTRA MATERIALS

A. Provide 1 sf of each size, color, and surface finish of tile specified.

1.9 COLORS

A. Colors are specified on Color and Materials Schedule on drawings.

PART 2 - PRODUCTS

2.1 TILE MATERIALS

A. Products:

1. Unglazed Terracotta (TL-1) base and floor tile:

a) Manufacturer: Casa Tile

1. Other acceptable Manufacturer / Suppliers

a. Mexican Tiles.com

b) Product:

1. 2” x 2” x ½” Mosaic High-Fired, Red Bisque, Terracotta tiles, 1/4” grout joint, set at 45 degrees to walls, sealer, and waxed finish.

2. .4 ¼” x 11 ¼” Cove base, Terracotta tile., 1/4” grout joint

2. Glazed Ceramic Tile (TL-2) Wall, Base and Chair rail tile.:

   a) Manufacturer: Daltile

   b) Product:

   1. Color Wheel Classic, 4 1/4” x 4.1/4” x ¼” Glazed ceramic Tile, 1/8” grout joint, set at 45 degrees to floor line.
   2. Color Wheel Classic, .6” x 6” Sanitary cover Base,1/8” grout joint.
   3. Chair rail tile, 2” x 6” x 5/16”, 1/16” grout joint

B. Substitutions: Under provisions of Section 01 30 00 Submittal Procedures.

C. Color and Finish as indicated on the Colors and Materials Schedule.

2.2 **MORTAR AND GROUT MATERIALS**

A. Manufacturers

1. Laticrete.

2. Mapei.

3. Custom Building Products.

4. Substitutions: Under provisions of Section 01 30 00 Submittal Procedures.

B. Grout: ANSI A118.3 epoxy grout. Laticrete “SpectraLOCK PRO Grout”

C. Mix and proportion pre-mix grout materials in accordance with manufacturer's instructions.

D. Color and Finish as selected by Architect as indicated on the Colors and Materials Schedule.

2.3 **ACCESSORIES**

A. Linear Floor Drain: Schluter Systems, Schluter® KERDI-LINE low profile linear floor drain specifically designed for bonded waterproofing assemblies. Formed stainless steel channel body and grate assembly, with 2" no-hub drain outlet, which can be center or off-set. Closed-design brushed stainless steel grate. Coordinate location of drain connection with Division 22 contractor.

B. Substitutions: Under provisions of Section 01 30 00 Submittal Procedures.

2.4 **UNDERLAYMENT**

A. Manufacturers:

1. Dal-Tile.

2. The Noble Company.

3. Schluter Systems.

B. Cleavage Membrane: Nobleseal CIS, high-performance crack isolation and control joint bridging membrane per ASTM A118.12, 0.030-inch thick membrane, CPE sheet laminated to non-woven fabric both sides; 1-14 "Extra-Heavy Service" rating per ASTM C 627.

C. Uncoupling Membrane: Schluter Systems. Schluter-DITRA, uncoupling, waterproofing and vapor management layer; 1/8 inch thick, high-density polyethylene (HDPE) membrane.

D. Waterproofing Membrane: Schluter Systems. Schluter-KERDI waterproofing membrane; 0.008 inch (8 mil) thick, polyethylene membrane, with polypropylene fleece laminated on both sides, which meets or exceeds the requirements of ANSI A118.10.

1. Waterproofing seaming membrane: Schluter®-KERDI-BAND Seams and Corners material 0.004 inch (4 mil) thick, polyethylene membrane, with polypropylene fleece laminated on both sides

2. Sealing and Bonding Compound: Schluter®KERDI-FIX: single-component, elastomeric, waterproof sealing and bolding compound with a silane-modified polymer base. Compound is free of solvents and odorless.

2.5 **SEALER**

A. Per manufacturers recommendations.

PART 3 - EXECUTION

3.1 **EXAMINATION**

A. Verify that surfaces are ready to receive work.

3.2 **PREPARATION**

A. Protect surrounding work from damage or disfiguration.

B. Clean surfaces.

C. Seal substrate surface cracks with filler. Level existing substrate surfaces to acceptable flatness tolerances.

3.3 INSTALLATION

A. Install tile per TCA and manufacturer's recommendations.

B. Thinset Method:

1. Wall Tile: W244F (with waterproof membrane over fiber cement backer board).

C. Install underlayment, adhesive, tile, and grout in accordance with manufacturer's instructions.

D. Install floor drain in accordance with manufacturer's instructions. Coordinate installation with plumbing, waterproofing and tile installation.

E. Lay tile to pattern indicated. Do not interrupt tile pattern through openings. Install tile in horizontal layout such that tile pattern is symmetrical between edges and provides the largest cut tile at corners.

F. Place edge strips at exposed tile edges.

G. Install metal floor edging at flooring transitions between tile and wood flooring.

H. Install metal floor edging at exposed perimeter edge conditions; tile abutting; epoxy coved wall base

I. Cut and fit tile tight to penetrations through tile. Form corners neatly.

J. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make joints watertight, without voids, cracks, excess mortar, or excess grout.

K. Sound tile after setting. Replace hollow sounding units.

L. Provide expansion joints in accordance with TCA recommendations and as indicated. Keep expansion joints free of mortar and grout. Apply sealant to joints.

M. Allow tile to set as required by manufacturer's instructions.

N. Seal porous tile prior to grouting joints with colored grouts. Do not seal glazed tile.

O. Grout tile joints.

P. Apply sealant to junction of tile and dissimilar materials and junction of dissimilar planes.

Q. Seal grout joints.

3.4 CLEANING

A. Clean tile and grout surfaces.

3.5 PROTECTION OF FINISHED WORK

A. Protect finished Work. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.

B. Do not permit traffic over finished floor surface for four (4) days after installation, or as recommended by manufacturer.

END OF SECTION

SECTION 096400 -WOOD FLOORING

PART 1 - GENERAL

1.1 **SECTION INCLUDES**

A. Restoration and refinishing of existing Douglas Fir & White Oak T&G plank Flooring and Installation and finishing of Oak tongue & grove plank flooring in Ticket Office and Douglas Fir T & G plank flooring in Waiting Room.

B. Repair existing Freight Room rough sawn board flooring, no applied finish, Natural Finish.

1.2 **REFERENCES**

A. ASTM E84 – Surface Burning Characteristics of Building Materials.

B. NWFA – National Wood Flooring Association.

1.3 **SUBMITTALS**

A. Submit under provisions of Section 01 33 00.

B. Shop Drawings: Indicate floor termination details, wall/base conditions and shimming systems as needed to allow co-planar condition where new and existing surfaces meet.

C. Product Data: Provide data for flooring and floor finish materials.

D. Samples: Submit one (1) sample (8 in. x 8 in.) in size mock up on hardwood backing illustrating floor finish, color, and sheen.

E. Manufacturer's Installation Instructions: Indicate special procedures, perimeter conditions requiring special attention, and/or coordination.

1.4 **MAINTENANCE DATA**

A. Submit under provisions of Section 01 77 00.

B. Maintenance Data: Include maintenance procedures, recommend maintenance materials, a suggested schedule for cleaning, stripping, and re-finishing, stain removal methods, and polishes and waxes.

1.5 **QUALITY ASSURANCE**

A. Perform work in accordance with NWFA – National Wood Flooring Association.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the products specified in this Section with minimum five (5) years' experience.

B. Installer: Company specializing in performing the work of this Section with minimum seven (7) years experience and pre-approved by manufacturer.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Do not install wood flooring until ambient air at installation space has moisture content stabilized.

B. Provide heat, light, and ventilation prior to installation.

C. Maintain room temperature and relative humidity in accordance with NWFA Standards for a minimum period of two (2) days prior to delivery of materials, during, and after construction.

1.8 EXTRA MATERIALS

A. Provide under provisions of Section 01 77 00.

1.9 COLORS

A. Colors are specified on Colors and Materials Schedule on drawings.

PART 2 – PRODUCTS

2.1 FLOOR FINISH MANUFACTURER

A. Synteko.

B. Glitsa, Division of Rudd Company

C. Substitutions: Under provisions of Section 01 60 00.

2.2 MATERIALS

A. Fir Wood Flooring: Species and grade stamped on underside of each piece, conforming to the following:

1. Species: Clear Douglas Fir, match existing profiles.

2. Grade: A; Clear Vertical Grain (CVG)

3. Type: Solid plank

4. Moisture Content: 8 to 10 percent.

5. Actual Thickness: 3/4-inch.

6. Actual Width of face: 3-1/4 inch.

7. Length: Length: 10 to 16 feet, variable & random, match proportions and modules of existing adjacent flooring.

8. Edge: Tongue and Groove.

9. End: Square

10. Length: Random, match proportions and modules of existing adjacent flooring.

B. Oak Wood Flooring: Species and grade stamped on underside of each piece, conforming to the following:

1. Species: White Oak, match existing profiles.

2. Grade: Select Oak

3. Type: Solid plank

4. Moisture Content: 8 to 10 percent.

5. Actual Thickness: 3/4-inch.

6. Actual Width of face: 2-1/4 inch.

7. Length: 10 to 16 feet, variable & random, match proportions and modules of existing adjacent flooring

8. Edge: Tongue and Groove.

9. End: Square

2.3 ACCESSORIES

A. Sheathing Paper: 15 lbs. building paper.

B. Blind Nailing: Size and spacing as recommended by flooring manufacturer.

C. Wood Plugs: Round shape, same species as flooring.

2.4 FINISHES

A. Floor Finish: Varnish to achieve matt glass surface; type recommended by flooring manufacturer and matching existing adjacent flooring.

1. Synteko Sealmaster, fast-drying sealer, available from Kelly Goodwin Company, or as approved and accepted by finish manufacturer.

2. Provide waterborne, matte finish, Synteko Extra, available from Kelly Goodwin Company, or approved, following sealer

B. Floor Stain: Penetrating type recommended by flooring manufacturer.

C. Sealer and Wax: Types recommended by flooring manufacturer and match existing.

PART 3 – EXECUTION

3.1 **EXAMINATION**

A. Verify wood subfloor is properly secured, smooth and flat to ±1/8 in. in 10 ft.

B. Verify that required floor mounted utilities are in proper location.

3.2 **PREPARATION**

A. Broom clean, then vacuum substrate.

B. Climatize wood to space in two weeks minimum in advance of installation to minimize expansion and contraction of wood.

C. Maintain 60-degree F. temperature in space once flooring arrives on site minimum two week in advance and during installation.

3.3 REPAIR OF EXISTING FLOORING

A. Patch and repair existing wood flooring as required to match existing installation.

B. Sand surfaces to be free of grease, wax, dirt, etc.

C. Clean with Synteko Remover 1692, or approved equal, then rinse with 10% vinegar in 90% water.

D. Sand or screen with a used 120 or 150 grit to obtain a matte surface.

E. Vacuum clean thoroughly.

3.4 **INSTALLATION**

A. Prepare existing sub-floor, replace damaged subfloor planks, and review that subflooring is properly attached to joints below. Re-nail as needed.

B. Place sheet vapor retarder over subfloor surface, lapping edges and ends minimum 6-inches.; staple in place.

C. New wood flooring is not to be delivered to site until all work has been completed in the space and is ready for floor installation to begin. Climatize wood prior to installation.

D. Lay flooring perpendicular to floor joists matching existing floor pattern, full width of room if possible. Verify alignment or orientation with existing runs. Randomly stager butt joints. Allow expansion space a long side walls of room, under wood base.

E. Blind nail flooring in accordance with manufacturer's instructions.

F. Terminate flooring at centerline of door openings where adjacent floor finish is dissimilar. Provide divider strips.

G. Install prefinished base shoe after floor has been finished.

3.5 FINISHING

A. Remove impurities from wood surface following industry standards. Primary sanding is done with coarse grit sandpaper and high roller pressure and smooth. Sand to ensure an even surface. Utilize a minimum of three progressively finer grits of sandpaper, finishing with 120 grit sandpaper. Sand flooring to smooth even finish with no evidence of sander marks. Take precautions to contain dust. Remove dust from flooring, baseboards, windowsills, etc., with vacuum.

B. Mask off adjacent surfaces, DO NOT DAMAGE.

C. Apply filler, stain and sealer coats in accordance with floor manufacturer's instructions. Notify Owner/Architect at completion of first coat. Do not proceed with advanced phases of finishing until Owner/Architect has approved work.

D. Allow drying time between coats per manufacturers requirements.

E. Apply second and third coats. Allow to dry. Lightly buff with steel wool and vacuum clean. Contact Owner/Architect for second approval.

3.6 CLEANING

A. Clean work under provisions of 01 77 00.

3.7 PROTECTION OF FINISHED WORK

A. Protect finished Work under provisions of Section 01 50 00

B. Prohibit traffic on floor finish for 48 hours after installation.

END OF SECTION

SECTION 099100 -PAINTING

PART 1 - GENERAL

1.1 **SECTION INCLUDES**

A. Field-Applied paints, stains, sealers and other coatings.

B. Shop-Applied paints, stains, sealers and other coatings.

1.2 **REFERENCES**

A. Master Painters Institute (MPI) Architectural Painting Specification Manual.

B. Master Painters Institute (MPI) Maintenance and Repainting Manual.

C. AAMA – American Architectural Manufacturers Association.

D. AAMA 2605 – Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Architectural Extrusions and Panels.

E. PCI – Powder Coating Institute.

1.3 **SUBMITTALS**

A. Samples:

1. Submit per Section 01 33 00 – Submittal Procedures, and the following:

a. Submit 8 in. x 10 in. color samples of color selections indicated on Colors and Materials Schedule on drawings. Submit samples in gloss selections scheduled.

b. Furnish additional required samples until colors, finishes, and textures are reviewed and Architect issues written authorization to proceed.

c. Retain approved samples for reference.

B. Materials and Products Lists (Typewritten):

2. Submit complete lists of products proposed for use in scheduled finish systems.

a. Arrange in same format as scheduled in this Section, and list MPI product numbers applicable to each system.

b. Include applicable manufacturer's recommendations.

c. Include additional information requested by Project Representative.

1.4 QUALITY ASSURANCE

A. Manufacturer: Company specializing in manufacturing the products specified in this Section with minimum three (3) years documented experience.

B. Applicator: Company specializing in performing the work of this Section with minimum three (3) years documented experience.

1.5 REGULATORY REQUIREMENTS

A. Conform to applicable code for flame and smoke rating requirements for finishes.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect, and handle products to site under provisions of Section 01 60 00 – Product Requirements.

B. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

C. Container label to include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

D. Store paint materials at minimum ambient temperature of 45 degrees F (7 degrees C) and a maximum of 90 degrees F (32 degrees C), in ventilated area, and as required by manufacturer's instructions.

E. Apply manufacturer’s standard protective coverings to shop-applied finished surfaces.

F. Deliver, store and handle shop-applied finished components in manner to prevent damage to finishes. Furnish touch-up paint along with each material shipment.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.

B. Do not apply exterior coatings during rain or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer.

C. Minimum Application Temperatures for Latex Paints: 45 degrees F (7 degrees C) for interiors; 50 degrees F (10 degrees C) for exterior; unless required otherwise by manufacturer's instructions.

1.8 EXTRA MATERIALS

A. Furnish under provisions of Section 01 77 00 –Closeout Procedures.

B. Maintenance Materials: Leave 1/2 gallon of each type and color of paint and other coating products for maintenance purposes.

1. Label for positive identification.

2. Store where directed.

3. Turn over to Owner at jobsite and obtain signed receipt.

1.9 WARRANTY

A. Furnish one (1) year warranty in accordance with referenced services "Manual" on full value of work included in this Section.

1. Warrant work to be in accordance with Specifications, standards and requirements incorporated in referenced manual.

2. Warranty not applicable to defective items through faulty work by other trades, or for failure of substrates.

3. Warranty does not assume any liability for claim other than repairing painting and finishing defects, as determined by Manual.

1.10 COLORS

A. Colors are specified on Colors and Materials Schedule on drawings.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Materials shall be in accordance with the MPI Architectural Painting Specification Manual “Approved Product” listing and shall be from a single manufacturer for each system used.

B. Conform also to governing regulations such as Federal and State requirements for pollution, safety, and health. Finishes shall have flame spread ratings that meets or exceeds IBC standards.

C. Materials not specifically indicated, but required, such as linseed, oil, shellac, thinners, shall be the highest quality product of an approved manufacturer listed in the MPI Architectural Painting Specification Manual.

D. Mixing: Furnish ready-mixed products.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that surfaces are ready to receive work as instructed by the product manufacturer.

B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.

C. Test shop applied protective coatings (primers) for compatibility with subsequent cover materials.

D. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:

1. Plaster and Gypsum Wallboard: 12 percent.

2. Masonry, Concrete, and Concrete Unit Masonry: 12 percent.

3. Interior Wood: 15 percent, measured in accordance with ASTM D2016.

4. Exterior Wood: 15 percent, measured in accordance with ASTM D2016.

3.2 MATERIALS NOT TO BE FINISHED

A. The following receive no finish except as indicated:

1. Metals as listed:

a. Brass, bronze, copper, plated metals, and stainless steel.

2. Plastic laminate surfacing.

3. Glass, unless otherwise noted.

4. Electronic switchplates; lighting fixtures.

5. Finish hardware.

3.3 PREPARATION

A. Prepare surfaces as follows and as specified in the MPI Architectural Painting Specifications Manual and the MPI Maintenance Repainting Manual. Consult manuals for surface preparations not indicated.

B. Refer to Section 09 99 50 - Repair and Preparation of Historic Wood Surfaces for Painting.

C. Remove electrical plates, hardware, light fixture trim, escutcheons, and fittings prior to

preparing surfaces or finishing.

D. Correct defects and clean surfaces that affect work of this Section. Remove existing coatings that exhibit loose surface defects.

E. Seal with shellac and seal marks which may bleed through surface finishes.

F. Impervious Surfaces: Remove mildew by scrubbing with solution of tri-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.

G. Gypsum Board Surfaces: Fill minor defects with filler compound. Spot prime defects after repair.

H. Galvanized Surfaces: Prepare surfaces to receive specified coating systems by removing contaminants, oils and pre-treatments, including chromate passivation, using one of the following methods approved by the paint manufacturer:

1. Apply a commercial clean and etch solution conforming to MPI #25 – Etching Cleaner in accordance with manufacturer's instructions.

2. Provide brush-off blast cleaning of the surface in accordance with SSPC-SP 7, using air pressures and abrasives that produce a suitable surface with minimal damage to underlying zinc coating.

3. Contractor may test surfaces for chromate passivation and use alternate methods of preparation as recommended by the paint manufacturer for galvanized surfaces that are confirmed to be negative for pre-treatment or passivation.

4. Coordinate with galvanized metal manufacturer for factory priming, where applicable, and prepare and prime factory-primed surfaces as recommended by the paint manufacturer to receive the specified topcoats. Test coat factory-primed surfaces for paint compatibility and adhesion.

I. Concrete Scheduled to Receive Paint Finish: Remove dirt, loose mortar, scale, salt or alkali powder, and other foreign matter. Remove oil and grease with a solution of tri-sodium phosphate; rinse well and allow to dry. Remove stains caused by weathering of corroding metals with a solution of sodium metasilicate after thoroughly wetting with water. Allow to dry.

J. Uncoated Steel and Iron Surfaces: Remove grease, mill scale, weld splatter, dirt, and rust. Where heavy coatings of scale are evident, remove by wire brushing; clean by washing with solvent. Apply a treatment of phosphoric acid solution, ensuring weld joints, bolts, and nuts are similarly cleaned. Spot prime paint after repairs.

K. Interior Wood Items Scheduled to Receive Paint Finish: Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats.

L. Interior Wood Items Scheduled to Receive Transparent Finish: Wipe off dust and grit prior to sealing, seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes

and cracks after sealer has dried; sand lightly between coats.

M. Exterior Wood Scheduled to Receive Paint Finish: Remove dust, grit, and foreign matter. Seal knots, pitch streaks, and sappy sections. Fill nail holes with tinted exterior calking compound after prime coat has been applied.

N. Wood Doors Scheduled for Painting: Seal top and bottom edges with primer.

3.4 APPLICATION

A. Perform the work in accordance with MPI Architectural Painting Specifications Manual and manufacturer's directions. Where these may be in conflict, the more stringent requirements govern.

B. All work shall be “Premium Grade” in accordance with referenced MPI manuals.

C. Perform the work for Shop-Applied Powder Coated High-Performance (PVDF) Fluoropolymer Resin Finish in accordance with PCI and AAMA 2605 specification and performance standards. Where these may be in conflict, the more stringent requirements govern.

D. Apply products in accordance with manufacturer's instructions.

E. Do not apply finishes to surfaces that are not dry.

F. Apply each coat to uniform finish.

G. Apply each coat of paint slightly darker than preceding coat unless otherwise approved.

H. Vacuum clean surfaces free of loose particles. Use tack cloth just prior to applying next coat.

I. Allow applied coat to dry before next coat is applied.

J. Where clear finishes are required, tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.

K. Prime concealed surfaces of woodwork with primer paint.

L. Prime concealed surfaces of interior woodwork scheduled to receive stain or varnish finish with gloss varnish reduced 25 percent with mineral spirits.

3.5 FINISHING MECHANICAL AND ELECTRICAL EQUIPMENT

A. Paint exterior exposed conduit, pipes and other miscellaneous unfinished electrical and mechanical equipment, components, assemblies and devices; including exposed related brackets and supports.

1. Electrical Panelboards.

2. Pipe and fittings.

3. Electrical Transformer.

B. Refer to Division 22, Division 23 and Division 26 for schedule of color coding and identification banding of equipment, duct work, piping, and conduit.

C. Paint shop primed equipment. Paint shop prefinished items occurring at interior areas.

D. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.

E. Prime and paint insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, except where items are prefinished.

F. Paint interior surfaces of air ducts that are visible through grilles and louvers with one coat of flat black paint, to visible surfaces. Paint dampers exposed behind louvers and grilles to match face panels.

G. Paint exposed conduit and electrical equipment occurring in finished areas.

H. Paint both sides and edges of plywood backboards for electrical and telephone equipment before installing equipment.

I. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

J. Paint existing mechanical grilles and diffusers that are to be reused in renovated spaces.

3.6 PATCHING

A. As work is completed in room areas, repair surfaces damaged by other trades requiring touch-up or refinishing. Surfaces where touch-up of damaged areas remains distinguishable from surrounding undamaged areas under normal viewing conditions shall be refinished to nearest corners or intersections.

3.7 CLEANING

A. As work proceeds, and on completion of work, promptly remove all spilled, splashed or splattered products so as not to damage surfaces.

1. During work progress, keep premises free from any unnecessary accumulation of tools, equipment, surplus materials, and debris.

3.8 PAINTING AND FINISHING TITLES AND CODE NUMBERS

A. References are from referenced manual unless otherwise indicated. They indicate coating system, grades, and acceptable manufacturers and products.

3.9 GLOSS

A. All finishes: Gloss as scheduled.

3.10 EXTERIOR PAINTING AND FINISHING SCHEDULE

(All Work Premium Grade)

A. Paint exterior surfaces in accordance with the following MPI Painting Specification Manual requirements:

1. Concrete Vertical Surfaces: (exposed concrete including soffits)

   EXT 3.1H: Water Repellent Clear Sealer.

2. Concrete Horizontal Surfaces: (plaza, sidewalks, curbs, paving and traffic markings)

   EXT 3.2H: Clear Sealer. W.B. (plaza, sidewalks, curbs and paving)

3. Galvanized (Protective Coating) Metal: (Miscellaneous steel, pipes, ducts, ladders, bollards, sheet metal flashing and trim)

   EXT 5.3B: Alkyd G5 semi-gloss finish.

5. Dimension Lumber: (columns, beams, joists, decking, siding, fencing, etc.)

   EXT 6.2A: Latex G1 satin finish (over alkyd primer).

6. Dressed Lumber: (including doors, door and window frames, casings, battens, smooth fascias, railings etc.)

   EXT 6.3B: Alkyd G5 semi-gloss finish.

6. Stained and varnished doors: (including doors, door frames, casings etc.)

   EXT 6.3H: Semi-transparent stain with varnish finish.

3.11 INTERIOR PAINTING AND FINISHING SCHEDULE

(All Work Premium Grade)

A. Paint interior surfaces in accordance with the following MPI Painting Specification Manual requirements:

1. Dressed Lumber: (including doors, door and window frames, casings, moldings, etc.)

INT 6.2C: Alkyd, Semi-gloss finish

Field paint interior flush wood doors and frames.

Field paint interior stile and rail wood doors and frames.

Field paint millwork as specified in Section 06 20 23 – Interior Finish Carpentry.

2. Dressed Lumber: (beadboard wall and ceiling panels)

   INT 6.2B: Latex, Satin finish

3. Semi-transparent dressed lumber (including doors and window frames, casings moldings etc.)

   INT 6.4E: Semi-transparent stain/polyurethane varnish G4 satin finish.

4. Plaster and Gypsum Board:

   INT 9.2A: Latex G3 eggshell finish.

3.12 FIELD QUALITY CONTROL

A. Conform to referenced manual's standards for work, unless otherwise indicated.

3.13 REPLACEMENT OF HARDWARE AND MISCELLANEOUS ITEMS

A. Reinstall items previously required to be removed.

3.14 CLEANING

A. At conclusion of project, thoroughly clean paint and splatters from glass, mirrors, and other surfaces. Take care not to scratch surfaces.

B. Clean residue of work of this section from any other surfaces.

C. At work's conclusion, leave premises neat and clean.

END OF SECTION

SECTION 099950 -REPAIR AND PREPARATION OF HISTORIC WOOD SURFACES FOR PAINTING

PART 1 - GENERAL

1.1 REFERENCES

A. American Conference of Governmental Industrial Hygienists (ACGIH) Limit Values Threshold Limit Values for Chemical Substances and Physical Agents Biological Exposure Indices

B. ASTM D 3274 Evaluating Degree of Surface Disfigurement of Paint Films by Microbial (Fungal or Algal) Growth or Soil and Dirt Accumulation

C. National Park Service, Preservation Brief Number 10 “Exterior Paint Problems on Historic Woodwork”

D. National Park Service, Preservation Technical Notes, Exterior Woodwork Number 1 “Proper Painting and Surface Preparation.

E. National Park Service, Preservation Technical Notes, Exterior Woodwork Number 1 “Paint Removal from wood siding.

F. “Wood-Epoxy Repairs for Exterior Woodwork,” by John Leeke, Preservation Consultant

G. The Secretary of the Interior’s Standards of Rehabilitation and Guidelines for Rehabilitating & Reconstructing Historic Buildings,” U.S. Dept. of the Interior, Nation American Conference of Governmental Industrial Hygienists (ACGIH) Limit Values Threshold Limit Values for Chemical Substances and Physical Agents Biological Exposure Indices

1.2 SUBMITTALS

A. Submit under provisions of Section 01 33 00.

B. Shop Drawings: Indicate materials, component profiles, fastening methods and fastener layout, joint details, trim and accessories.

C. Samples: Submit (2) samples for each piece of finished lumber, decking, siding, panel and trim material specified. Submit (2) samples for each fastener specified. Submit samples illustrating specified finish.

D. Product data and manufacturer’s installation instructions.

1. The names and intended of materials proposed.
2. Manufacturer's current printed product description
3. Material safety data sheets (MSDS) and technical data sheets for each product.
4. Detailed mixing, thinning and application instructions, minimum and maximum application temperature, and curing and drying times

E. Work Plan: Provide written outline of approach.

F. Mock-Up: 6 ft. x 6 ft. restoration & surface preparation mockup area for both exterior and interior restoration work.

1. Mockup on existing building surface to show surface preparation method and to establish paint removal requirements that meet with Project Representative expectations of finished project. Mock to be reviewed and approved by Project Representative to proceeding with the full restoration work.

G. Certificate stating that products proposed for use meets or exceeds the VOC regulations of the local Air Pollution Control Districts having jurisdiction over the geographical area in which the project is located

1.3 QUALITY ASSURANCE

A. Contractor shall have a minimum of five years' experience in the restoration and repair of wood and timber; as well as restoration and repair of wood windows and doors.

B. Perform work in accordance with AWS/AWI Premium Grade quality standards.

1.4 SAFETY AND HEALTH

A. Work shall comply with the work plan mentioned above, paying specific attention to material handling and the potential impact of surface preparation operations on personnel and on others involved in and adjacent to the work zone.

B. Worker Exposures

1. Exposure of workers to chemical substances shall not exceed limits as established by ACGIH Limit Values.

C. Training

1. Workers having access to an affected work area shall be informed of:

a. The contents of the applicable material data safety sheets (MSDS)

b. Potential health and safety hazard and protective controls associated with materials used on the project.

c. Workers involved in surface preparation and clean up shall be trained in the safe handling and application, and the exposure limit, for each material that the worker will use in the project.

d. Personnel having a need to use respirators and masks shall be instructed in the use and maintenance of such equipment.

e. An affected work area is one that may receive dust, mists, and odors from the surface preparation operations.

1.5 SEQUENCING

A. Work shall be coordinated to minimize exposure of other Contractor personnel, and visitors to mists and odors from surface preparation, cleaning and finishing operations.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store and protect products under provisions of Section 01 60 00.

PART 2 – PRODUCTS

2.1 MANUFACTURER/SUPPLIER

A. Acceptable Manufactures: Abatron, Inc., 5501 95th Ave., Kenosha, WI 53144, www.abatron.com, Tel: 800/445-1754/Fax: 262/653-2019.

B. Substitutions: Under provisions of Section 01 60 00.

2.2 CHEMICAL PAINT REMOVERS (INTERIOR CASEWORK AND MILLWORK)

A. Chemical paint removers shall be a commercial item specifically manufactured for the type of paint to be removed.

1. Material: paint stripper, Peel-A-Way or approved.

2.3 MATERIALS

A. Wood Preservative:

1. Boron-based concentrated wood preservative.
   a. Material: Bora-Care

B. Wood Consolidant

1. Liquid wood consolidant shall consist of a 2-part, low-viscosity liquid epoxy that meets the following criteria.

a. Material: Wood Consolidant Liquid, Abatron “LiquidWood” low viscosity, penetrating epoxy compound or approved.

C. Wood Replacement Compound (Epoxy)

1. Epoxy paste shall consist of a 2-part, paste that meets the following criteria.

a. Material: Adhesive wood replacement paste, Abatron “WoodEpox” light-weight, thixotropic epoxy adhesive or approved.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that substrate surfaces openings are ready to receive work.

B. Beginning of installation means installer accepts existing surfaces.

3.2 PREPARATION

A. Coordinate with Section 09 91 00 for priming front and back faces, edges, and ends after cutting and prior to installation.

3.3 GENERAL

A. Paint shall be removed by the gentlest means possible. Abrasive and blasting methods of paint removal and cleaning are not allowed.

B. Power sanders and wire brushes are not allowed without prior written approval by the owner. Power finish sanders with fine grit sandpaper will only be considered for finial finish prep work following paint removal but sanders shall have integral vacuum dust collection system.

C. The building surface is composed of a variety of wood profiles and materials. Each painted surface may require a different paint preparation technique to achieve a sound paintable surface without inflicting damage that may mar the building's historic character. Experimentation will be required to determine the most successful approach prior to general removal of the painted surfaces.

D. Before stripping has started, test a small, out of the way, area of any surface to be stripped to ensure that the results will be satisfactory. This will also inform the thickness to apply the product and the time values for removing the product.

E. Test Samples from mockup for lead levels of the residue of the paint/paste.

F. Paint removed from the surfaces shall be collected and properly disposed of offsite.

3.4 EXTRIOR WOORWORK AND SIDING

A. Exterior painted surfaces in generally poor condition, these surfaces are to be carefully scraped with a sharp clean carbide hand scrapper to remove loose paint to a sound bare wood surface. Replace blades if chipped to reduce damage to wood surface.

B. Loose paint shall be removed with a hand scraper and vacuum system, to minimize dust.

3.5 INTERIOR WOORWORK, WALL AND CEILING PANELING AND CASEWORK

A. Interior painted surfaces are in various stages of condition. Paint shall be stripped down to a bare wood surface on all millwork, sash, frames and casework. Remove loose paint on Beadboard paneling and prep for refinishing. Repair or replace damaged or missing elements and prepare surface for new finish., Refer to Finish Schedule for finish requirements.

B. Apply stripper in accordance with manufacturer's guidelines. technique will vary

according to age and thickness of paint being removed. Cover pastes with fibrous laminated cloth printed polyethylene side facing out. Leave on for up to 24 hours or more according to test patch findings. Remove by sliding tool or taping knife into dried up paste around the edges of the cloth, easing paint, paste, and cloth away from the surface in one piece. Remove as much as possible with tool before clean-up procedure.

C. Neutralize surfaces according to manufacturers' strict instructions. Failure to properly clean and neutralize the surface interfere with performance of varnishes, sealers or future painted finishes.

END OF SECTION

SECTION 101400 - SIGNAGE

PART 1 - GENERAL

1.1 **REFERENCES**

A. ICC/ANSI A117.1 - Accessible and Usable Buildings and Facilities.

1.2 **SUBMITTALS**

A. Submit under provisions of Section 01 33 00.

B. Shop Drawings: Indicate sign styles, lettering font, foreground and background colors, locations, overall dimensions of each sign.

C. Samples: Submit sample signs, illustrating type, style, letter font, and colors specified; method of attachment.

D. Manufacturer's Installation Instructions: Include installation template and attachment devices.

1.3 **QUALIFICATIONS**

A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three (3) years documented experience.

1.4 **REGULATORY REQUIREMENTS**

A. Install in conformance with Title III of the Americans and Disabilities Act, Public Law 101-336.

1.5 **DELIVERY, STORAGE, AND HANDLING**

A. Deliver, store, protect, and handle products to site under provisions of Section 01 60 00.

B. Package signs, labeled in name groups.

1.6 **COLORS**

A. Colors are specified on Colors and Materials Schedule.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Plaque and Letter Signs

1. Inpro Corporation, Muskego, WI; 800-222-5556
2. Gemini USA, Cannon Falls, MN 800-538-8377 (letters & logos), 877-877-2922 (plaques)
3. Apco Northwest,Seattle, WA: 800-815-8028
4. Graphic Systems, Inc., Fort Wayne, IN 260-485-9667
5. Compliance Signs: 800-578-1245

B. Traffic Signs

1. Zumar Industries, Tacoma, WA: 253-536-7740
2. My Parking Sign, 800-952-1457

C. Substitutions under provisions of Section 01 60 00.

2.2 EXTERIOR SIGNAGE

A. Building Signage:

1. Hand painted Depot “KITTITAS” sign, refer to drawings.

B. Accessible Parking Signs

1. Accessible parking sign with "State Disabled Parking Permit Required" message.
2. Location: At accessible parking stall.
3. Manufacturer: Zumar Industries, Inc. (800) 426-7967.
    a. Model Number: Washington State Regulatory Sign #R7-801.
4. Installation: Posts are 2-3/8 in. O.D. galvanized steel with exposed end capped. Attachment bolts and nuts to be peened to deter removal.

2.3 INTERIOR SIGNAGE

A. Accessible Restroom Sign.

1. ADA, Men, Women, Unisex restroom signage with accessible symbol.

2. Plaque size: 6”x 9”.

3. Plaque Material: Acrylic with matte finish.

4. Manufacturer: Compliance Signs, Designer ADA Series, 1-800-578-1245, (www.compliancesigns.com).

5. Colors: Select from Manufacturer’s full range of standard colors.

6. Mounting: Adhesive mounting strips.

PART 3 - EXECUTION

3.1 **EXAMINATION**

A. Verify that substrate surfaces are ready to receive work.

3.2 **INSTALLATION**

A. Install in accordance with manufacturer's instructions.

B. Install signs after all wall and ceiling surfaces are painted and finished.

C. Install centered and level, in line and in accordance with manufacturer's instructions. Mount signs as indicated and in accordance with the provisions of ICC/ANSI A117.1.

D. Install exterior pole-mounted sign in minimum 2 ft 0 in. deep by 12 in. diameter concrete base. Locate traffic signage per City of Kittitas requirements relative to roadway and sign height.

E. Clean and polish in accordance with manufacturer's recommendations.

END OF SECTION

SECTION 102813 -TOILET ACCESSORIES

PART 1 - GENERAL

1.1 **REFERENCES**

A. ICC/ANSI A117.1 - Accessible and Usable Buildings and Facilities.

B. ASTM A167 - Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.

C. ASTM A269 - Seamless and Welded Austenitic Stainless-Steel Tubing for General Service.

D. ASTM A366 - Steel, Carbon, Cold-Rolled Sheet, Commercial Quality.

E. ASTM B456 - Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium.

F. NEMA LD-3 - High Pressure Decorative Laminates.

1.2 **SUBMITTALS**

A. Submit under provisions of Section 01 33 00 – Submittal Procedures.

B. Product Data: Provide data on accessories describing size, finish, details of function, attachment methods.

C. Samples: Submit samples of each component, illustrating color and finish.

D. Manufacturer's Installation Instructions: Indicate special procedures, and perimeter conditions requiring special attention.

1.3 **REGULATORY REQUIREMENTS**

A. Install in conformance with Title III of the Americans with Disabilities Act, Public Law 101-336.

1.4 **COORDINATION**

A. Coordinate the work with the placement of internal wall reinforcement and reinforcement of toilet partitions to receive anchor attachments.

1.5 **SEQUENCING AND SCHEDULING**

A. Coordinate the work of this Section with Section 06 10 00 - Rough Carpentry, for the placement of blocking to receive anchor attachments. Contractor to provide blocking for all accessories and toilet compartments, including Owner furnished accessories.

1.6 **KEYING**

A. Master key all accessories.

1.7 **COLORS**

A. Colors are specified on Color and Materials Schedule on drawings.

PART 2 - PRODUCTS

2.1 **MANUFACTURERS**

A. Subject to conformance with specification requirements, the following manufacturers are acceptable:

1. Bobrick Washroom Equipment, Inc.

2. American Specialties.

3. Bradley.

B. Substitutions: Under provisions of Section 01 60 00 – Product Requirements.

2.2 **MATERIALS**

A. Stainless Steel Sheet: ASTM A167, Type 304.

B. Tubing: ASTM A269, stainless steel.

C. Plastic Laminate: NEMA LD-3, Fire Rated Type; 0.125 in. thick, matte finish, color as selected.

D. Adhesive: Contact type, waterproof.

E. Concealed Fasteners, Screws, and Bolts: Hot-dip galvanized of type and size as required.

F. Exposed Fasteners, Screws, and Bolts: Tamper-proof, stainless steel of type and size as required.

G. Expansion Shields: Fiber, lead, or rubber as recommended by accessory manufacturer for component and substrate.

2.3 **FABRICATION**

A. Weld and grind joints of fabricated components, smooth.

B. Form exposed surfaces from single sheet of stock, free of joints. Form surfaces flat without distortion. Maintain surfaces without scratches or dents.

C. Fabricate grab bars of tubing, free of visible joints, return to wall with end attachment flanges.

D. Shop assembled components and package complete with anchors and fittings.

E. Provide steel anchor plates, adapters, and anchor components for installation.

2.4 FINISHES

A. Galvanizing Ferrous Metals: ASTM A123 to 2.0 oz/sq yd. Galvanize ferrous metal and fastening devices.

B. Shop Primed Ferrous Metals: Pretreat and clean, spray apply one (1) coat primer and bake.

C. Enamel: Pretreat to clean condition, apply one (1) coat primer and minimum two (2) coats epoxy baked enamel.

D. Chrome/Nickel Plating: ASTM B456; Satin finish.

E. Stainless Steel: No. 4 Satin finish.

F. Back paint components where contact is made with building finishes to prevent electrolysis.

2.5 TOILET ACCESSORIES

(Models listed are Bobrick unless manufacturer is listed.)

A. Toilet Tissue Dispenser (Surface Mounted): Waxie Products, Clean and Soft Twin 9” Jumbo Roll Tissue Dispenser, model number 851143.

B. Soap Dispenser (Surface Mounted): Install (1) soap dispenser per toilet room lavatory sink. Owner furnished Contractor installed.

C. Mirrors (Framed): Tempered glass mirror with stainless steel channel frame. Model: B-165 2436.

D. Paper Towel Dispenser (Surface-Mounted): Owner furnished Contractor installed.

E. Grab Bars: B-6806 Series, concealed mounting flange, 1-1/2 inch diameter tubing 18-gauge, straight bars. Install (3) grab bars at each ADA water closet stall; refer to drawings for minimum grab bar lengths and mounting requirements.

F. Grab Bars: B-6806 Series, concealed mounting flange, 1-1/2 inch diameter tubing 18-gauge, straight bars. Install grab bars at each ADA shower; refer to drawings for minimum grab bar lengths and mounting requirements.

G. Coat hooks: B-2116; heavy-duty clothes hook, stainless steel. Theft-resistant mounting. Install one (1) coat hook at the inside of the entry door, centered on door.

PART 3 - EXECUTION

3.1 **EXAMINATION**

A. Verify that site conditions are ready to receive work and dimensions are as indicated on shop drawings.

B. Verify exact location of accessories for installation.

3.2 **PREPARATION**

A. Deliver inserts and rough-in frames to site for timely installation.

B. Provide templates and rough-in measurements as required.

3.3 **INSTALLATION**

A. Install accessories in accordance with manufacturers' instructions and ANSI A117.1.

B. Install plumb and level, securely and rigidly anchored to substrate.

3.4 **ADJUSTING AND CLEANING**

A. Adjust all moving parts to operate perfectly.

B. Clean all exposed surfaces.

C. Leave installations free of imperfections, premises free of any residue of work of this section.

END OF SECTION

SECTION 104400 - FIRE PROTECTION SPECIALTIES

PART 1 - GENERAL

1.1 REFERENCES

A. NFPA 10 - Portable Fire Extinguishers.

1.2 SUBMITTALS

A. Section 01 33 00 - Submittals: Procedures for submittals.

B. Product Data: Provide extinguisher operational features, color and finish, anchorage details, rough-in measurements, location and details.

1.3 ENVIRONMENTAL REQUIREMENTS

A. Do not install extinguishers when ambient temperature may cause freezing of extinguisher ingredients.

1.4 COLORS

A. Colors are specified on Colors and Materials Schedule on drawings.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers:

1. J. L. Industries.
2. Larsens' Manufacturing Co.
3. Potter – Roemer.
4. Substitutions: Under provisions of Section 01 60 00.
5. Specification is based on products manufactured by Larsen's.

2.2 EXTINGUISHERS

A. Multipurpose dry chemical type, Larsen's MP5, 2A-10BC U.L. rating. Provide maintenance/inspection recordkeeping tag on each extinguisher meeting requirements of N.F.P.A. 10 and local authority having jurisdiction. Extinguishers shall be properly charged with charging/inspection date noted on tag.

2.3 CABINETS

A. Larsen's Model No. 2409-5R (Semi-Recessed) Duo break glass door style with lock and no handle, clear anodized aluminum construction, with tempered glass. Provide Series "B" mounting bracket for fire extinguisher inside cabinet so that top of extinguisher is clearly visible with door closed.

B. Mounting Hardware: Appropriate to cabinet and wall construction.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work according to General Conditions.

B. Verify rough openings for cabinet are correctly sized and located.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install cabinets plumb and level in wall openings.

C. Secure cabinets rigidly in place in accordance with manufacturer's instructions.

D. Place extinguishers and accessories in cabinets.

END OF SECTION

SECTION 124800 ENTRANCE FLOORING SYSTEM

PART 1 - GENERAL

1.1 **REFERENCES**

A. Standards listed by reference, including revisions by issuing authority, form a part of this specification section to extent indicated. The Standards listed here are identified with a designation number, title or other designation established by the issuing authority.

1.2 **SUBMITTALS**

A. General: Submit listed submittals in accordance with the Conditions of the Contract and Division 1 Submittal Procedures Section.

B. Product data: Submit product data, including manufacturer's specification sheet and installation instructions for specified products. Include methods of installation and substrate preparation for each type of substrate.

C. Samples: Submit samples for each type and color of exposed entrance mat, frames and accessories required. Provide sample of mat materials.

D. Closeout Submittals: (1) Cleaning & Maintenance Data (Include methods for maintaining installed products and precautions against cleaning materials and methods detrimental to finishes and performance), and (2) Warranty.

1.3 **SEQUENCING/SCHEDULING**

A. Ordering: Comply with Manufacturer’s ordering instructions and lead-time requirements to avoid construction delays.

B. Delivery: Deliver materials in Manufacturer’s original, unopened, undamaged packaging.

C. Storage: Store materials at temperature and in humidity conditions recommended by manufacturer and protect from exposure to harmful weather conditions.

D. Installation: Except as otherwise indicated herein, sequencing or scheduling for performance of work of this section in relation with other work is Contractor's option. Delay installation of mats until near time of substantial completion for the project.

1.4 **PROJECT CONDITIONS**

A. Temperature: Maintain temperature where products will be installed before, during and after installation as recommended by Manufacturer.

1.5 COLORS

A. Colors are specified on Colors and Materials Schedule.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURER

A. Milliken Floor Company.

2.2 ENTRANCE FLOORING TILE MATERIALS

A. Surface Floor Mat (WOM-1): Milliken Entrance Flooring, Quadrus , Style – Liftoff Mat

1. Construction: Tufted, Cut Pile
2. Tufted Face Weight: 28 oz/sq. yd.
3. Yarn Type: Milliken-Certified WearOn®, Nylon, Multi- and Monofilament, Type 6,6 and 6
4. Backing: Nitrile rubber with smooth backing
5. Product Type: Carpet Mat

PART 3 – EXECUTION

3.1 SUBSTRATE PREPARATION

A. Examine substrates and conditions where floor system will be installed. Do not proceed with installation until unsatisfactory conditions are corrected. Sub floor shall be clean and dry, and within acceptable tolerances.

3.2 INSTALLATION

A. Site Conditions: The installation of entrance flooring should not begin until the work of all other trades has been completed, especially overhead trades. Areas to receive flooring should be clean, fully enclosed and weather tight. The permanent HVAC must be fully operational, controlled and set at a minimum of 68°F for a minimum of seven days prior to, during, and seven days after the installation. The flooring material should be conditioned in the same manner for at least 48 hours prior to installation. Areas to receive flooring shall be adequately lighted to allow for proper inspection of the substrate, installation and seaming of the flooring, and for final inspection.

3.3 CLEANING AND PROTECTION

A. General Cleaning: Refer to Manufacturer’s Cleaning and Maintenance Instructions.

B. Owner’s Personnel: Instruct Owner’s personnel in proper maintenance procedures.

C. Protection: Protect installed product and finish surfaces from damage during construction and until acceptance.

END OF SECTION

SECTION 124940 ROLLER SHADES

PART 1 - GENERAL

1.1 **REFERENCES**

A. ASTM G 21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.

B. NFPA 701-99 - Fire Tests for Flame-Resistant Textiles and Films.

1.2 **SUBMITTALS**

A. Submit under provisions of Section 01 33 00-Submittal Procedures.

B. Product Data: Manufacturer's data sheets on each product to be used, including:

1. Preparation instructions and recommendations.

2. Styles, material descriptions, dimensions of individual components, profiles, features, and operating instructions.

3. Storage and handling requirements and recommendations.

4. Mounting details and installation methods.

C. Shop Drawings: Plans, elevations, sections, product details, installation details, operational clearances, wiring diagrams and relationship to adjacent work.

D. Window Treatment Schedule: For all roller shades. Use same room designations as indicated on the Drawings and include opening sizes and key to typical mounting details.

E. Selection Samples: For each finish product specified, one set of shade cloth options and aluminum finish color samples representing manufacturer's full range of available colors and patterns.

F. Maintenance Data: Methods for maintaining roller shades, precautions regarding cleaning materials and methods, instructions for operating hardware and controls.

1.3 **QUALITY ASSURANCE**

A. Installer Qualifications: Installer trained and certified by the manufacturer with a minimum of ten years' experience in installing products comparable to those specified in this section.

B. Fire-Test-Response Characteristics: Passes NFPA 701-99 small and large-scale vertical burn. Materials tested shall be identical to products proposed for use.

C. Anti-Microbial Characteristics: 'No Growth' per ASTM G 21 results for fungi ATCC9642, ATCC 9644, ATCC9645.

D. Product Standard: Provide roller shades complying with WCMA A 100.1.

1.4 DELIVERY, STORAGE AND HANDLING

A. Deliver shades in factory-labeled packages, marked with manufacturer and product name, fire-test-response characteristics, and location of installation using same room designations indicated on Drawings and in the Window Treatment Schedule.

1.5 PROJECT CONDITIONS

A. Environmental Limitations: Install roller shades after finish work including painting is complete and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

1.5 SUBSTITUTIONS

A. Substitutions under provisions of Section 01 60 00 Product Requirements.

1.7 WARRANTY

A. Manufacturer's Warranty: Provide manufacturer's standard limited warranty.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURER

A. Hunter Douglas Architectural

B. MechoShade Systems, Inc.

C. Inpro Corporation

D. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00.

2.2 MATERIALS

A. Basis of Design: Hunter Douglas, Ultraglide Roller Shade.

1. Shade Cloth (Fabric): Alustra, Woven Textures,

2. Flame retardant, fade, and stain resistant, light filtering,

3. Color: as indicated on Colors and Materials Schedule.

B. Shade Fabrication: Fabricate units to completely fill existing openings from head to sill and jamb-to-jamb, unless specifically indicated otherwise.

1. Fabricate shadecloth to hang flat without buckling or distortion. Fabricate with heat-sealed trimmed edges to hang straight without curling or raveling. Fabricate unguided shadecloth to roll true and straight without shifting sideways more than 1/8 inch (3.18 mm) in either direction per 8 feet (2438 mm) of shade height due to warp distortion or weave design. Fabricate hem as follows: Bottom hem weights.

2.3 COMPONENTS

A. Access and Material Requirements:

1. Provide shade hardware allowing for the removal of shade roller tube from brackets without removing hardware from opening and without requiring end or center supports to be removed.

2. Provide shade hardware that allows for removal and re-mounting of the shade bands without having to remove the shade tube, drive or operating support brackets.

3. Roller shades are to be installed without valance or fascia, for vintage shade appearance.

B. Manual Operated Chain Drive Hardware and Brackets:

1. Provide for universal, regular, and offset drive capacity, allowing drive chain to fall at front, rear or non-offset for all shade drive end brackets. Universal offset shall be adjustable for future change.

2. Provide positive mechanical engagement of drive mechanism to shade roller tube. Friction fit connectors for drive mechanism connection to shade roller tube are not acceptable.

3. Provide shade hardware constructed of minimum 1/8-inch (3.18 mm) thick plated steel or heavier as required to support 150 percent of the full weight of each shade.

C. Drive Chain: #10 qualified stainless-steel chain rated to 90 lb. (41 kg) minimum breaking strength.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, operational clearance, and other conditions affecting performance.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 ROLLER SHADE INSTALLATION

A. Install roller shades level, plumb, and aligned with adjacent units according to manufacturer's written instructions, and located so shade band is not closer than 2 inches (50 mm) to interior face of glass. Allow clearances for window operation hardware.

3.3 ADJUSTING

A. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.

3.4 CLEANING AND PROTECTION

A. Clean roller shade surfaces after installation, according to manufacturer's written instructions.

B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that roller shades are without damage or deterioration at time of Substantial Completion.

C. Replace damaged roller shades that cannot be repaired, in a manner approved by Project Representative, before time of Substantial Completion.

END OF SECTION

SECTION 200500 – COMMON WORK RESULTS FOR MECHANICAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.

B. Division 22 - Plumbing Systems.

C. Division 23 - Heating, Ventilation, and Air Conditioning (HVAC) Systems.

1.2 WORK INCLUDED

A. General Mechanical System Requirements.

B. Mechanical System Motors.

C. Identification and Labeling.

1.3 DEFINITIONS

A. Abbreviations, Terms and Symbols: Where not defined elsewhere in the Contract Documents, shall be as defined in RS Means Illustrated Construction Dictionary, Fourth Addition and in the ASHRAE Handbook of Fundamentals, latest edition.

B. "As required" means "as necessary to form a safe, neat, and complete working installation (or product), fulfilling all the requirements of the specifications and drawings and in compliance with all codes."

C. "Concealed" means "hidden from view" as determined when areas are in their final finished condition, from the point of view of a person located in the finished area. Items located in areas above suspended ceilings, in plumbing chases, and in similar areas are considered "concealed." Items located in cabinet spaces (e.g. below sinks) are not considered concealed.

D. "Coordinate" means "to accomplish the work with all others that are involved in the work by: directly discussing the work with them, arranging and participating in special meetings with them to discuss and plan the work being done by each, obtaining and completing any necessary forms and documentation required for the work to proceed, reaching agreement on how parts of the work performed by each trade will be installed relative to each other both in physical location and in time sequence, exchanging all necessary information so as to allow the work to be accomplished with a united effort in accordance with the project requirements".

E. "Finished Areas" means "areas receiving a finish coat of paint on one or more wall surface."

F. "Mechanical", where applied to the scope of work, includes all project plumbing systems, HVAC systems, and controls for these systems and all work covered by specification Divisions 20, 22, and 23. Such work is shown on multiple drawings and is not limited to a particular set of sheets, or sheets prefaced with a particular letter.

G. The term "related documents" (as used at the beginning of each specification section), and the Specification Divisions and Sections listed with it, is only an indication of some of the specification sections which the work of that section may be strongly related to. Since all items of work relate to one another and require full coordination, all specification sections, as listed in the Table of Contents, shall be considered as being "related documents", and shall be considered (by this reference) in the same manner as if they had all been listed under the term "related documents" in each specification section.

H. "Work included" (as used at the beginning of each specification section), and the items listed with it, is only an indication of some of the items specified in that Section and is in no way limiting the work of that Section. See complete drawings and specifications for all required work.

I. "Verify" means "Contractor shall obtain, by methods independent of the project Architect/Engineer and Owner, the information noted and the information needed to properly perform the work".

J. "Substitution": As applied to equipment means "equipment that is different than the 'Basis of Design' equipment scheduled on the drawings (or otherwise indicated in the contract documents)".

1.4 GENERAL REQUIREMENTS

A. Scope: Furnish all labor, materials, tools, equipment, and services for all mechanical work. This section applies to all Division 20, 22, 23 specifications and to all project mechanical work.

B. General: All work shall comply with Division 00, General Conditions, Division 01, and all other provisions of the Contract Documents.

C. Code:
1. Compliance: All work shall be done in accordance with all applicable codes and ordinances. Throughout the Project Documents, items are shown or specified in excess of code requirements; in all such cases, the work shall be done so that code requirements are exceeded as indicated. Comply with code accessibility requirements.
2. Documentation: Maintain documentation of all permits and code inspections for the mechanical work; submit documentation showing systems have satisfactorily passed all AHJ inspections and requirements.
3. Code Knowledge: Contractor and workers assigned to this project shall be familiar and knowledgeable of all applicable codes and ordinances. Code requirements are typically not repeated in the Contract Documents. By submitting a bid, the Contractor is acknowledging that the Contractor and workers to be utilized on this project have such knowledge.
4. Proof of Code Compliance: Prior to final completion, satisfactory evidence shall be furnished to show that all work has been installed in accordance with all codes and that all inspections required have been successfully passed. Satisfactory evidence includes

signed inspections by the local code authority, test lab results, qualified and witnessed field tests, and related acceptance certificates by local code authorities, and field notes by the Contractor as to when all inspections and tests occurred.

D. Complete Systems: Furnish and install all materials, appurtenances, devices, and miscellaneous items not specifically mentioned herein or noted on the drawings, but which are necessary to make a complete working installation of all mechanical systems. Not all accessories or devices are shown or specified that are necessary to form complete and functional systems.

E. Review and Coordination:
1. General: To eliminate all possible errors and interferences, thoroughly examine all the Drawings and Specifications before work is started, and consult and coordinate with each of the various trades regarding the work. Such coordination shall begin prior to any work starting, and continue throughout the project.
2. Suppliers: Suppliers of products shall review the documents to confirm that their products are suitable for the application and that all manufacturers requirements and recommendations have been satisfactorily addressed in the Contract Documents. Where not addressed the supplier shall notify bidders and the Engineer prior to bidding to resolve any issue or include in their bid an adequate amount to resolve the issue.

F. Conflicts and Discrepancies: Notify the Architect/Engineer of any discrepancies or conflicts before proceeding with any work or the purchasing of any materials for the area(s) of conflict until requesting and obtaining written instructions from the Architect/Engineer on how to proceed. Where conflicts occur, the most expensive and stringent requirement (as judged by the Architect/Engineer) shall prevail. Any work done after discovery of such discrepancies or conflicts and prior to obtaining the Architect/Engineer's instructions on how to proceed shall be done at the Contractor's expense.

G. Drawings and Specifications: Drawings and specifications are complementary and what is called for in either is binding as if called for in both. The drawings are diagrammatic and show the general arrangement of the construction and therefore do not show all offsets, fittings and accessories which are required to form a complete and operating installation. Mechanical work is shown on multiple drawings and is not limited to a particular set of sheets, or sheets prefaced with a particular letter.

H. Offsets/Fittings:
1. Piping Systems: Include in bid all necessary fittings and offset to completely connect up all systems, maintain clear access paths to equipment, and comply with all project requirements. Offsets are required to route piping around building structural elements, roof slopes, mechanical systems, electrical systems, and numerous other items. Due to the schematic nature of the plans such offsets are typically not shown. Contractor is responsible to determine the quantity of offsets and fittings required, and the labor involved. No added payment or “extras” will be granted for the Contractor’s failure to correctly estimate the number of offsets and fittings and labor required. Contractor is advised that equipment and fixture connections may require more than 20 elbows per plumbing fixture and coil per pipe line.
2. Duct Systems: Include in bid all necessary fittings, offsets, and transitions to completely connect all systems, maintain clear access paths, and comply with all project requirements. Offsets are required to route ducts around building structural elements, roof slopes, mechanical systems, electrical systems, and numerous other items. Due to the schematic nature of the plans such offsets are typically not shown. Contractor is

responsible to determine the quantity of offsets and fittings required, and the labor involved. No added payments or "extras" will be granted for the Contractor's failure to correctly estimate number of offsets, fittings, transitions and labor required. Contractor is advised that transitions are required at connections to all equipment, to all air inlets/outlets, crossing of beam lines, at crossing with piping, and similar locations.

I. Design: The level of design presented in the documents represents the extent of the design being furnished to the Contractor; any additional design needed shall be provided by the Contractor. All design by the Contractor shall be performed by individuals skilled and experienced in such work, and where required by local code (or elsewhere in the documents) shall be performed by engineers licensed in the State where the project is located. Include in bid the costs of all such project design; including engineering, drafting, coordination, and all related activities and work. Such designs services are required for many building systems; including but not limited to ductwork at equipment, piping at fixtures and equipment, hanger/support systems, temporary duct/piping systems, mechanical offsets/adjustments to suit other system, seismic anchors, and for methods/means of accomplishing the work. Where design or performance criteria to be met is not stated (or is unclear), develop proposed criteria (based on code, similar projects, and related data) and submit the proposed criteria for review prior to performing full design work.

J. Special Tools: Furnish to the Owner one complete set of any and all special tools such as odd size wrenches, keys, etc. (allen wrenches are considered odd), which are necessary to gain access to, service, or adjust any piece of equipment installed under this contract. Each tool shall be marked or tagged to identify its use. Submit a written record listing the special tools provided, date, and signed by the Owner's representative receiving the tools.

K. Standards and References: Shall be latest edition unless a specific edition, year, or version is cited, or is enforced by the AHJ.

L. Warranties:
1. General: Products and workmanship shall be warranted to be free from all defects, capable of providing satisfactory system operation, and conforming to the requirements of the Contract Documents. Include in the project bid all costs associated with project warranties to ensure that the warranty extends for the required period; possible project delays and failure by others to complete their work may cause the start of the warranty period to be delayed. The Contractor shall be responsible for increasing the warranty dates by corresponding amounts to provide the required warranty periods.
2. Basic Project Warranty: As described in the General Conditions, Supplementary Conditions, and Division 01. See individual specification sections for specific warranty requirements. Start date and duration are as indicated in General Conditions, Supplementary Conditions, and Division 01. Where not indicated otherwise, the basic project warranty shall start at project substantial completion and be for one year.
3. Special Warranties: See individual specification sections for special warranty requirements and extended warranty periods beyond the basic project warranty.

M. Permits and Fees:
1. Obtain and pay for all permits, licenses, fees and inspections as required by the Code and as specified herein (unless noted otherwise).
2. Pay all charges made by any utility company or municipality for material, labor or services incident to the connection of service (unless noted otherwise).

1.5 SUBSTITUTIONS

A. General: See Division 00 and 01 for information and requirements regarding substitutions. Manufacturers not scheduled on the plans or listed as "Acceptable Manufacturers" require prior approval and shall submit a substitution request form (see Division 01 for requirements and limitations). See Paragraph 2.1 this specification section regarding "Acceptable Manufacturers".

B. Redesign:
1. The Contract Documents show design configurations based on particular manufacturers. Use of other manufacturers' products (i.e. substitutions) from what is shown (or specified) may require redesign of mechanical, plumbing, controls, fire protection, electrical, structural, and general building construction to accommodate the substitution.
2. Review the installation requirements for substitutions and provide redesign of all affected construction. The redesign shall be equal or superior in all respects to the Architect/Engineer's design (as judged by the Architect/Engineer), including such aspects as equipment access, ease of maintenance, utility connection locations, unit electrical requirements, noise considerations, unit performance, and similar concerns.
3. Redesign shall be done by the Contractor and shall meet the requirements and have the approval of the Architect/Engineer prior to beginning work. Apply for and obtain all permits and regulatory approvals.

C. Construction Modifications: Provide all required construction modifications to accommodate the substituted products; this includes all mechanical, plumbing, controls, fire protection, electrical, structural, and general building construction. Construction modification shall comply with code, specifications, and be equal to designed construction.

D. Costs: Cost of redesign, construction costs, and all additional costs incurred to accommodate substituted equipment shall be borne by the Contractor.

E. Submittals: In addition to other required submittals, submit shop drawings showing the redesign for substituted equipment; submittal shall include installation plans and sections, connecting services (i.e. ducts, piping, electrical) locations and routing, required service clearances, and related installation details. Submit data required by other disciplines to allow review of the impact of the substitution (i.e. weights, electrical).

1.6 QUALITY ASSURANCE

A. Experience: All work shall be performed by individuals experienced and knowledgeable in the work they are performing, and experienced with the same type of systems and building type as this project. By virtue of submitting a bid, the Contractor is acknowledging that workers to be utilized on this project have such experience and knowledge. Upon request of the Engineer, submit resumes showing the work history, training, and types of projects worked on, for individuals assigned to this project.

B. Code: Utilize workers experienced and knowledgeable with codes pertaining to their work; verify code compliance through-out the project.

C. ASME: All pressure vessels, pressure vessel safety devices, and pressure vessel appurtenances shall comply with the standards of, and bear the stamp of ASME.

D. Quality Assurance Checks: Prior to ordering products and making submittals, confirm the following for each:
   1. General: Product is suitable for the intended purpose and complies with the Contract Documents.
   2. Manufacturer: Product's manufacturer is listed as an acceptable manufacturer in the Contract Document's or a substitution request (where allowed) has been submitted and the manufacturer has been listed as acceptable.
   3. Electrical (for products requiring electrical power):
      a. Product is for use with the voltage/phase as indicated on the electrical plans (or for the electrical circuit the item will be connected to).
      b. Product's ampacity requirements (MCA) do not exceed that indicated on the electrical plans (or for the electrical circuit the item will be connected to).
   4. Weight: Product's weight is no greater than that indicated.
   5. Space Verification: Product will fit in the space available, and along the path available to install the item, will have adequate service clearances, and will not impede on any clearances required for other items in the space the item will be located.
   6. Installation: A suitable method for installing the product has been selected which meets the project schedule and other requirements.
   7. Anchorage/Support: The manufacturers recommended method of anchorage and support is consistent with the method indicated in the Contract Documents, and the item has provisions suitable for such anchorage/support.
   8. Lead Time: The product's fabrication, shipping, and delivery period meets the project schedule requirements.
   9. Substituted Equipment: Where equipment is not the basis of design confirm all requirements for substituted equipment have been met and shop drawings of construction revisions have been (or are being) prepared.
   10. Controls: Item is compatible with the controls it will be connected to and has been coordinated with the firm providing the project control work to provide the specified (or required) sequence of operation.
   11. Listing: Item is Listed when required to be as such. And if the item is to be installed as part of a Listed system or assembly, it is compliant with the Listing of the overall system or assembly.

1.7 SUBMITTALS

A. General:
   1. See Division 00 and 01 for submittal requirements.
   2. By making a submittal (of shop drawings or product data) the Contractor represents that they have reviewed them for compliance with the Contract Documents, including detailed connection and installation features and requirements, and that the submitted item is their proposed method of compliance with the Contract Documents.
   3. Perform no portion of the work for which the Contract Documents require a submittal until the respective submittal has been made, the review completed by the Architect/Engineer, and all issues resolved.
   4. The Owner and Architect/Engineer are depending on the submittal process as a final review and confirmation of materials and various aspects of the work, and may make changes in the project due to information contained in the submittals and with the understanding that the opportunity to make changes exist until submittals are made and the review is completed. The Contractor is responsible for added costs which may be incurred if work is performed which limits the Owner the opportunity to make such

changes (e.g. work done prior to a submittal being made or the submittal review being completed).

5. Submittals shall be logically organized, neat and legible. Submittals to include:
   a. Name of project.
   b. Owner's name.
   c. Specification section reference and paragraph (or drawing number or detail) submittal is for.
   d. Contractor name and contact information.
   e. Subcontractor name and contact information.
   f. Date of submittal.
6. Electronic Files: Submittals that are sent electronically shall have a separate .pdf file corresponding to the each specification section. Files shall be named with the specification number and title.
7. Architect/Engineer's actions on items submitted for review:
   a. Authorizing purchasing, fabrication, delivery, and installation:
      1) "No Exceptions Taken"
      2) "Make Corrections Noted, No Resubmittal Required". At Contractor's option, submit corrected item, with review notations acknowledged and incorporated.
   b. Not authorizing purchasing, fabrication, delivery, and installation:
      1) "Make Corrections Noted; Revise and Resubmit". Resubmit revised item, with review notations acknowledged and incorporated.Non-responsive resubmittals may be rejected.
      2) "Rejected". Submit item complying with requirements of Contract Documents.

B. Quality Assurance: By submitting an item for review, the Contractor is claiming that all "Quality Assurance Checks" (see paragraph 1.6 this specification Section) have been performed and satisfactorily passed and no further comment from the submittal reviewer is required for the "Quality Assurance Checks".

C. Variations: Only variations that are specifically identified as described herein will be considered. Provide with the submittal (in addition to other information required): description of the proposed variation, entity who is proposing the variation, why the variation is being proposed, any cost changes associated with the variation, and any other pertinent data to allow for review. Failure to submit information on the variation as described will result in the submittal review being conducted without considering the variation.

D. Product Submittals - Information Required:
1. Manufacturer's professionally developed documents, containing product description, model number, and illustrations. Mark clearly to identify pertinent information and exact model and configuration being submitted.
2. List of accessories and options provided with product.
3. Product dimensions and clearances required.
4. Product weight.
5. Submittal identified with product name and symbol (as shown on the drawings or written in the specifications) and specification Section and paragraph reference.
6. Performance capacity and characteristics showing compliance with the Contract Documents.
7. Manufacturer's and local manufacturer's representative names, addresses, and phone numbers.

8. For equipment requiring piping or duct connections:
   a. Type of connections required.
   b. Size and locations of connections.
9. For electrically operated equipment:
   a. Number and locations of electrical service connections required.
   b. Voltage required.
   c. Fuse or circuit breaker protection requirements.
   d. Motor starter requirements; if motor starter is furnished with the equipment, submit product information on motor starter.
10. For equipment requiring control connections:
    a. Type of control signals required.
    b. Control communication protocol.
    c. Information on control devices furnished with equipment.
    d. Location of control connections.
11. Manufacturer's installation instructions.
12. See each specification Section for additional submittal requirements.
13. Edited Content: Submittals shall indicate the equipment and options that are to be provided. Copies of an unedited catalog will be rejected. Pages/items that are not applicable shall be deleted prior to submittal to the Engineer.

E. Shop Drawing Submittals:
1. Shop drawings shall be professionally drafted using AutoCAD, Revit, or an equivalent compatible program (hand sketches are not acceptable). Shop drawings shall be independently developed by the Contractor and not be a copy of the Contract Drawings.
2. Submit electronic files in original drafting format (i.e. *.dwg) and pdf format with as-built documentation.
3. Provide shop drawings for the following systems:
   a. HVAC control systems.
   b. For any parts of any system which are to be installed differently than as shown on the drawings.
   c. Construction revisions to accommodate Substituted Equipment.
   d. Other areas/work as noted in the Contract Documents.
   e. For those systems requiring shop drawings, reference system's specification Section for additional requirements.

F. Re-Submittals: If submittals are marked ‘Rejected’ or ‘Revise and Resubmit’, the Contractor shall revise the submittal to satisfy the comments or conform to project requirements, and submit to the Engineer for review. Only those items that were rejected or required a resubmittal will be reviewed by the Engineer; All other items will not be reviewed. All re-submittals shall be at least one of the following:
1. Provide a ‘Re-Submittal Summary Sheet’ which indicates how each comment was addressed (it is acceptable to add the responses to a copy of the original submittal review comments).
2. Cloud (or otherwise clearly identify) the revised portions to indicate what is different from the original submittal.

1.8 RECORD DOCUMENTS

A. Field Record Drawings: Maintain a set of full size contract plans at the project site upon which all changes from the as-bid plans are noted. Plans shall be maintained clean, dry and legible;

with information recorded concurrent with construction progress. These plans shall also include actual locations (with dimensions) of all underground and concealed mechanical systems. Connection points to outside utilities shall be located by field measurements and so noted on these record drawings. All addenda, change order, field orders, design clarifications, request for information, and all other clarifications and revisions to the plans shall also be made a part of these record drawings. Plans shall be available for weekly review by the Architect/Engineer. Label drawing "As-Builts" with date, name of Contractor, and name of individual overseeing the work.

B. Final Field Record Drawings Submittal: Deliver to the Architect/Engineer the original Field Record drawings and one full size copy (may be scanned, and submitted in PDF format).

1.9 PRODUCT HANDLING, PROTECTION AND MAINTENANCE

A. Protection:
1. Protect all products from contamination, becoming unclean, and from damage of any kind and whatever cause; when being handled, in storage, and while installed, until final project acceptance.
2. Completely cover fixtures, motors, control panels, equipment, and similar items to protect from becoming unclean and damage of any kind.
3. Protect premises and work of other trades from damage due to Mechanical work.

B. Openings: Cap all openings in pipe, ductwork and equipment to protect against entry of foreign matter until all work that could cause unclean conditions or damage is complete (including work that has dust or fumes associated with it). Caps shall be of sufficient strength and seal integrity to prevent entry of water or fumes for the most extreme conditions they may be exposed to (i.e. high velocity water spray, high winds, concrete splash, etc.)

C. Storage: Provide properly conditioned and sheltered storage facilities for products to prevent damage of any kind and to maintain new condition. Provide adequate venting arrangements to avoid condensation damage.

D. Operation and Maintenance:
1. General: Inspect products periodically to confirm conditions and maintenance needs. Keep records of inspections and (upon request) forward to the Architect/Engineer prior to project final acceptance. Operation and Maintenance shall be in accordance with manufacturer's written procedures and recognized best maintenance practices. Keep records of maintenance and (upon request) forward to the Architect/Engineer prior to project final acceptance.
2. Stored Products: Provide maintenance (i.e. equipment rotation, lubrication, flush, cleaning, etc.) and inspection on products while stored to maintain new condition.
3. Installed Products: Provide maintenance and inspection of products and operate mechanical systems until substantial completion or specified Owner Instruction has been provided (whichever is later). Maintenance shall include all labor and materials and all manufacturers' recommended maintenance (i.e. strainer cleaning, filter changes, bearing lubrication, belt tensioning, etc.). In addition to scheduled maintenance, review all equipment periodically to allow detection of improper operation or any special maintenance needs; review shall be consistent with best practices for the product but in no case less than a site visit every two weeks. Document all maintenance activities.

E. Damaged Products: Damaged products shall be replaced with new. Where damage is limited to paint (or similar finish), the product may remain if the finish is restored to a new condition (as judged by the Architect/Engineer).

1.10 JOB CONDITIONS

A. Special Requirements:
   1. Maintain emergency and service entrance usable to pedestrian and vehicle traffic at all times. Where trenches are cut, provide adequate bridging for traffic.
   2. Coordinate startup and shutdown of all mechanical systems and utilities with related trades and the Owner's representative.
   3. Coordinate all construction activities with the Owner's Representative and cooperate fully so as to minimize conflicts and to facilitate Owner usage of the premises during construction.
   4. Provide temporary services to occupied areas to accommodate Owner's use during construction. All temporary work shall comply with same specifications as for new work and be of same quality.

B. Downtime Restrictions: Contractor shall notify the Owner at least 72 hours in advance of any intended shut-down of any building services or systems and obtain Owner approval prior to proceeding.

C. Schedule of Work: Arrange work to comply with schedule of construction, and so as not to violate any downtime restrictions, and to accommodate the Owner's scheduled use of the premises during construction.

1.11 ENGINEER FIELD REVIEWS AND TEST WITNESSING

A. General: Arrange construction schedule and notifications to the Engineer to accommodate Engineer’s schedule and the possibility of review times occurring up to 14 days after notification, and for the possible failure to satisfactorily pass Engineer’s reviews requiring revisions and re-reviews.

B. Notification: Notify Engineer at least 7 days in advance of readiness for reviews; arrange mutually agreed upon times for the reviews to occur.

C. Access: Provide ladders, any special tools and safety equipment to allow Engineer's access to areas and equipment. Remove and reinstall ceiling tiles, access panels, and similar items where requested to allow for reviews.

D. Review of Systems with Equipment:
   1. Prior to Engineer’s review, system’s equipment shall have received specified start-up and be substantiated by a written report.
   2. Prior to Engineer’s review, systems shall have been operating properly for at least five consecutive days prior to the scheduled review date.
   3. Personnel shall be present to operate the system’s equipment and controls, and to vary system settings as directed by the Engineer to allow for a review of operation over a range of settings.

1.12 REFERENCES

A. ASME A13.1: Scheme for the Identification of Piping Systems.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. General: Any reference in the Specifications or on the Drawings to any article, device, product, material, fixture, form or type of construction by manufacturer, name, make, model number, or catalog number shall be interpreted as establishing a standard of quality and shall not be construed as limiting competition. The manufacturers listed as Acceptable Manufacturers may bid the project for the items indicated without submitting a substitution request; however that does not relieve the products from having to comply with the Contract Documents.

B. Substitutions: Products by manufacturers listed as “Acceptable Manufacturers” (other than those listed as the “Basis of Design”) are considered substitutions and shall comply with the requirements for substitutions. See Paragraph titled “Substitutions” in Part 1 of this specification section.

C. Considerations: In reviewing a manufacturer for acceptance, factors considered (as compared to the specified item) include: engineering data showing item's capacity, performance, proper local representation of manufacturer, likelihood of manufacturer's future local support of product, service availability, previous installations, previous use by Owner/Engineer/Architect, product quality, availability/quality of maintenance and operation data, electrical requirements, capacity/performance, acoustics, physical dimensions, weight, items geometry and access requirements, utility needs, and similar concerns.

D. Limitations of the Term “Acceptable Manufacturer”: The listing of a manufacturer as an Acceptable Manufacturer does not necessarily mean that the products of that manufacturer are equal to those specified. The listing is only an indication of those manufacturers which have represented themselves as being capable of manufacturing, or have in the past manufactured, items equal to those specified. The burden to review products to confirm equivalency with the specified products is on the Contractor. The Architect/Engineer shall be the final judge as to whether an item is equal to that specified.

E. Quality: Products provided by Acceptable Manufacturers shall be equal to or superior to the specified manufacturer's item in function, appearance, and quality, and shall fulfill all requirements of the Contract Documents. The Architect/Engineer shall be the judge as to whether an item meets these requirements or not.

F. Manufacturer: To be considered as being made by a particular manufacturer, the product must be made directly by the manufacturer and have the manufacturer’s name (or nameplate with name) affixed to the product (or on the product container where direct labeling is not possible). Example: manufacture “A” is listed as an acceptable manufacture; manufacturer “B” is not listed as an acceptable manufacturer; manufacturer “A” owns “B”; products from “B” do not qualify as being made by an acceptable manufacturer by virtue of ownership.

2.2 PRODUCTS - GENERAL

A. Standard Products: Products shall be standard products of a manufacturer regularly engaged in the manufacture of such products. The standard products shall have been in satisfactory commercial or industrial use for two years prior to bid opening. The two year use shall include applications of equipment and materials under similar circumstances and of similar size. The two year's experience must be satisfactorily completed by a product which has been sold or is offered for sale on the commercial market through advertisements, manufacturers' catalogs, or brochures. Except that equipment changes made solely to satisfy code requirements, to improve unit efficiency, or to comply with unique project requirements are not required to have two year prior operation.

B. Latest Design: Products shall be the latest design and version available from the manufacturer, including software. Discontinued products shall not be used.

C. Service Support: Qualified permanent service organizations for support of the equipment shall be located reasonably convenient to the equipment installation and able to render satisfactory service to the equipment on a regular and emergency basis during the warranty period of the contract.

D. Manufacturer's Nameplate: Equipment shall have a manufacturer's nameplate bearing the manufacturer's name, address, model number, serial number, and additional information as required by code. Nameplate shall be securely affixed in a conspicuous place. The nameplate of the distributing agent will not be acceptable. Nameplate shall be of durable construction, easily read, with lettering minimum size 12 font.

E. Compatibility: All components and materials used shall be compatible to the conditions and materials the items will be exposed to. All items exposed to the weather shall be galvanized, or be of stainless steel or similar corrosion resistant material.

F. Sizes: Sizes indicated for products manufactured to standardized sizes (e.g. pipe, pipe fittings, valves, material gauges, etc.) are minimums. During bidding confirm that the sizes are available and meet project requirements. Where indicated sizes are not available provide the next larger available size; confirm this larger size will suit the construction and meet Contract Document requirements prior to ordering. Such size revisions are subject to Engineer’s review; indicate size revisions on the product submittal and why the size is being revised.

G. Non-Specified Items: Materials shown on the drawings but not specified shall be provided as shown and as required to suit the application illustrated and intended and shall be of commercial quality, consistent with the quality of similar type items provided on the project. Not all items shown on the drawings necessarily have a corresponding specification; such items shall be provided per this paragraph and so as to provide complete, finished, fully functioning mechanical systems.

H. Weights: Do not exceed the weights shown unless added structural supports are provided. Such supports shall meet the requirements of the project Structural Engineer. The Contractor shall bear all costs for all redesign and added supports to accommodate heavier equipment. The Contractor shall reimburse the Engineer for all time associated with all review and analyses regarding the use of equipment heavier than that indicated.

I. Temperature/Pressure Rating: All materials and components furnished shall be suitable for the temperature and pressures they will be exposed to. Contractor shall consider possible operating modes to ensure proper material ratings.

J. Standardization: All products of the same type shall be by the same manufacturer and have the same characteristics and features to allow for Owner's standardization.

K. Model Numbers: Any reference to a manufacturer's "model number" is a reference to a manufacturer's series number or type of product, and is not a complete "model number" in having all the necessary numbers/letters to convey all of the features, accessories, and options that are required. These series numbers are only meant to convey a type of product that may meet the project requirements. Where conflicts or discrepancies occur regarding a listed manufacturer's series or "model" number and specified capacities or features, the more stringent and expensive shall prevail.

L. Application and Suitability: Products shall be designed and intended for the use indicated, and be suitable for the operating conditions they will be exposed to. Firms supplying the products shall review the documents and related site and environmental data to confirm compliance. By making product submittals and using products they are being represented as appropriate for the project and application shown.

2.3 ELECTRICAL

A. General: All electrical devices, wiring, products, and work shall comply with the Division 26 specifications and code. See drawings for building occupancy type, types of construction, and areas which may require special wiring methods or other electrical work. Electrical disconnects shall be accessible as required by code, and shall not require removal of screens, equipment, or other items to access.

B. Equipment: All equipment requiring power shall be factory wired to an equipment mounted junction box (or an accessible compartment with power terminals or electrical device) arranged to allow for connection of electrical power.

C. Overcurrent protection: Circuit breakers, circuit breaker disconnects, fuses, and other current limiting devices indicated to be provided, shall be rated to suit the maximum overcurrent rating of the item served, and have other ratings, as required by code. Circuit breakers for HVAC and refrigeration unit equipment shall be UL listed by HACR type.

D. Short Circuit Current Rating (SCCR): All equipment (or components) requiring the use of electrical power shall have a SCCR value to comply with code. The minimum rating shall be 65,000 Amps RMS Symmetrical unless a lower value is indicated on the plans or allowed by code. Where the Contractor wishes to utilize equipment having a lower rating, the Contractor shall be responsible to provide calculations substantiating that a lower SCCR is acceptable (and complies with code), or make revisions to the electrical system to accommodate the proposed equipment (or components).

E. Product Certification (Listing): Products which require connection to electrical power shall be certified (i.e. listed) by a Nationally Recognized Testing Laboratory (NRTL) and be labeled (in a conspicuous place) with such certification (or certification mark). Certification shall comply with code, OSHA Standards, and Authority Having Jurisdiction (AHJ) requirements. NRTL's

shall be recognized as such by OSHA and the AHJ. Certification shall be for the complete assembly (approval of individual components is not acceptable). Field evaluations to obtain certification shall be performed by accredited product testing laboratories acceptable to the AHJ and Engineer, be performed in accordance with code, NFPA 791, recognized practices, and be labeled to identify the certification.

F. Power Restart: All equipment, components and systems shall be configured to automatically restart upon restoration of power after a power failure (i.e. either generator power, UPS power, or utility power); unless specifically noted otherwise or required for safety reason to require manual restart. Provide staged restart as required by the control sequences or for proper generator operation or system operation.

2.4 MOTORS

A. General: Where a piece of equipment specified includes an electric motor, the motor shall be factory installed and mounted. Motor starters and motor electrical disconnect switches shall be provided by the Contractor doing the work of the Section where the item was specified, unless specifically shown to be provided by Division 26 (or another Division). Wiring from the motor to motor starters and to electrical disconnects shall be by the Contractor doing the work of the Section where the item was specified, unless specifically shown to be provided by Division 26.

B. Acceptable Manufacturers: General Electric, TECO-Westinghouse, Reliance, Gould, Century, Baldor, U.S. Motors, Marathon, and acceptable manufacturers for the equipment (see individual specification sections).

C. Type: Motor type shall comply with code and applicable standard requirements and be configured to suit the application. Motors located indoors shall be open frame, drip-proof type, unless indicated otherwise. Motors located outdoors exposed to weather shall have corrosion resistant finish and shall be totally enclosed fan cooled (TEFC) or totally enclosed non-ventilated (TENV) type, unless indicated otherwise.

D. Listing: All motors shall be UL listed.

E. Efficiency: Motor efficiencies shall comply with code. Fractional horsepower motors shall be the electronically commutated (EC) type with speed control where noted and where non-EC motors are not available which comply with code efficiency requirements. Motor power factor shall comply with code, local utility requirements, and as indicated. Provide added power factor correction devices as necessary to comply.

F. Sizing: Motors shall not be smaller than indicated and of adequate size to start and drive the respective equipment when handling the quantities specified without exceeding the nameplate full load current at the conditions indicated and for the expected operating conditions. If it becomes evident that a motor furnished is too small to meet these requirements as a result of the Contractor using substituted equipment or having revised the system arrangement, the Contractor shall replace it with a motor of adequate size at no additional cost to the Owner. Contractor shall also arrange with the Electrical Contractor to increase the size of the wiring, motor starter and other accessories as required to serve the larger motor at no additional cost to the Owner.

G. Service Factor: Minimum 1.15.

H. EC Motors (ECM):
1. General: Electronically commutated type with integral inverter to convert AC power (of voltage/phase indicated) to DC power, and solid state circuitry to vary output power and speed of motor. Motor shall have permanently lubricated bearings with an L10 life of 100,000 hours at expected operating conditions. Motor shall have rotor position and rotation detection as required for operation.
2. Speed Range: Motor speed shall be controllable down to 25% of full speed.
3. Manual Speed Control: Provide with manual speed adjustment dial for motor speed control. Dial shall be motor mounted unless indicated otherwise, operable by a screwdriver or by hand. Motor mounted controls shall be factory wired. Remote mount dials shall be hand operable (i.e. no tools required), shall be for mounting on a standard 2 x 4 electrical junction box, and be able to be located up to 100 feet remote from the motor. Motor control wiring for remote mount dials shall be factory wired from the motor to an equipment mounted junction box (with field supplied wiring from this J-box to the remote dial).
4. EMCS Control: Motor speed shall be adjustable via a remote 0-10V input signal (unless noted otherwise) from the building EMCS. Control wiring shall be factory wired from the motor to an equipment mounted junction box. EMCS control is not required where not indicated to be provided or where not utilized as part of the control sequence.
5. Control Power: Provide with integral transformer, factory wired, as needed to power motor controls. Locate transformer at motor or equipment.

2.5 IDENTIFICATION AND LABELS

A. General: All piping, valves, and mechanical equipment shall be labeled. Labels in concealed accessible spaces shall be reviewed and verified by Architect/Engineer prior to being concealed.

B. Piping:
1. Type: Self-sticking colored identification markers, lettered to identify the pipe contents, and banded at each end with arrow tape indicating the direction of flow. Markers shall be similar and equal to Brady "System 1" and Seton "Opti-Code" markers. Spray painted stencil labeling is not acceptable. Some labels may be special order.
2. Identification Colors: Comply with ASME A13.1, and as follows:

Conveyed Material/System	Background	Letters
Potable Water	Green	White

3. Lettering: Lettering shall identify the material conveyed in each pipe and shall match the designation used on the plans, but without abbreviations. Systems which have supply and return piping shall have piping labeled as such (i.e. heating water return, heating water supply, etc.). Systems that have different pressures shall be labeled to indicate such (i.e. Steam-Low Pressure, Steam- Medium Pressure, Natural Gas-Low Pressure, Natural Gas-Medium Pressure, etc.).
4. Size: Size of letters and color field shall comply with ASME A13.1, repeated here for convenience:

Outside Diameter of Pipe or Covering	Length of Color Field	Size of Letters
3/4 to 1-1/4 Inches	8 Inches	1/2 Inches
1-1/2 to 2 Inches	8 Inches	3/4 Inches
2-1/2 to 6 Inches	12 Inches	1-1/4 Inches

5. Applications: Install on all exposed piping adjacent to each shut-off valve, at branches to indicate changes of direction, where pipes pass through walls and floors, on 20 foot centers or at least one in each room on each pipe. Markers shall be installed on all concealed accessible piping (i.e., piping above suspended ceilings, behind access doors, in accessible chases, etc.) near the point of access. For piping above suspended ceilings, markers shall be installed the same as if the piping was exposed (i.e., same as if the suspended ceiling was not in place). Markers shall be installed so as to be easily read by a person standing on the floor. Provide additional flow arrows at each pipe connection at valves having more than 2 ports (i.e. 3-way control valves).
6. Other Requirements: See other specification Sections for additional requirements.

C. Valves:
1. Labels: Laminated plastic or phenolic material, at least 1/16-inch thick, with black surface layer and white (unless other color indicated) sub-layer for letter engraving to expose sub-layer. Labels shall not be less than 3" x 1" in size. Label shall be pre-drilled at one end for attachment to valve. Attach to valve with No. 6 polished nickel-steel jack chain of sufficient length to allow label to hang free.
2. Lettering: Engrave label with valve size, name of system served (cold water, heating water supply, chilled water supply, etc.) and purpose of valve. Lettering size 3/16-inch, except where needed to be smaller to fit label size.
3. Application: Labels shall be installed on all valves except valves at hydronic system coils and equipment where the valve purpose is readily obvious.

D. Equipment:
1. Labels: Laminated plastic (or phenolic) material, 1/16-inch thick, with black surface layer and white (unless other color indicated) sub-layer, with engraving through to expose white sub-layer. Minimum 2-inch high (unless indicated otherwise or required due to equipment size) with length to contain required lettering. Label shall be pre-drilled and be mechanically fastened to the equipment. Prior to making labels, submit a list of all proposed labels.
2. Lettering: All caps, engraved on label, with equipment designation (same designation as used on Contract Drawings; e.g. HVAC-101, EF-22, CP-1A). Air handling equipment (i.e. VAV terminal units, fans, etc.) labels shall include the room names and numbers or area of building served (use final installed room designations). Where systems serve portions of the building (i.e. wings or floors), include on label the area served. Lettering shall be in multiple rows, with equipment label on top row. Equipment lettering to be 5/8-inch high; area served lettering to be 3/8-inch high (except that smaller lettering may be used if necessary to fit label size).
3. Application: All scheduled mechanical equipment shall be labeled. The label shall be located on a side of the equipment so as to be easily read, with the marking visible to a person standing at the access level near the equipment (assuming any necessary access to a concealed unit has been made).

E. Electrical Devices:
1. Labels: Minimum 1/4-inch high (unless indicated otherwise) lettering, all caps, engraved on laminated plastic or phenolic material, at least 1/16-inch thick. Laminated plastic (or phenolic) shall have black surface layer and white (unless other color indicated) sub-layer, with engraving through to expose white sub-layer. Label shall be pre-drilled and be mechanically fastened to the item; where mechanical fastening is not possible use 3M VHB double sided specialty tape No. 4945. Prior to making labels, submit a list of all proposed labels.

2. Lettering: Label shall identify the item served (using the same designation as indicated on the Contract Drawings), the source of power (by panel and circuit breaker), and comply with code.
3. Application: Variable frequency drives, motor starters, disconnects, contactors, relays and similar items which control power to equipment and system components shall be labeled. The label shall be located so as to be easily read. See Section 23 09 33 for labeling of low voltage control components.

F. Duct Access Doors:
1. Labels: Minimum 1-inch high (unless indicated otherwise) lettering, engraved on laminated plastic or phenolic material, at least 1/16th inch thick. Laminated plastic (or phenolic) shall have red surface layer and white (unless other color indicated) sub-layer, with engraving through to expose white sub-layer. Label shall be pre-drilled and be mechanically fastened to the duct access door.
2. Lettering: Label shall comply with code, and indicate the item being accessed (i.e. Fire/Smoke Damper, Fire Damper, CO2 Sensor, etc.).
3. Application: All duct access doors serving fire dampers, fire/smoke dampers, smoke dampers, control dampers, items required by code, and control devices shall be labeled. The label shall be located so as to be easily read, with the marking visible to a person standing at the access level near the access door (assuming any necessary access to a concealed label has been made).

G. Concealed Items:
1. General: Equipment, valves, dampers and similar items concealed above accessible ceilings shall have the ceiling marked below the item to identify the item and its location.
2. Marking System: The marking system shall consist of an engraved phenolic label, minimum 1/16-inch thick and 3/4-inch high with 1/2-inch high lettering. Label shall be black with white lettering. Apply labels to ceiling grid system using 3M double sided tape (3M VHB #4945).
3. Labeling: Shall identify equipment using the same designation indicated on the plans; valves shall be identified by size and system (e.g. EF-1, VAV-101, VALVE 4" CW). Prior to making labels, submit a list of all proposed labels.

PART 3 - EXECUTION

3.1 GENERAL

A. Workmanship: Furnish and install products to provide complete and functioning systems with a neat and finished appearance. If, in the judgment of the Architect/Engineer, any portion of the work has not been installed in accordance with the Contract Documents and in a neat workmanlike manner, or has been left in a rough, unfinished manner, the Contractor shall be required to revise the work so that it complies with the Contract Documents, at no increase in cost to the Owner.

B. Coordination: Coordinate the work with all trades that may be affected by the work to avoid conflicts, allow proper maintenance access, provide required clearances, and to allow for an organized and efficient installation of all systems.

C. Submittals: Perform no portion of the work for which the Contract Documents require a submittal until the respective submittal has been made, the review completed by the Architect/Engineer, and all issues resolved.

D. Examination and Preparation: Examine installation conditions and verify they are proper and ready for the work to proceed. Verify compatibility of materials in contact with other materials, and suitability for conditions they will be exposed to. Do not proceed with the work until unsatisfactory conditions have been corrected. Prepare area to accept the work and prepare products for the installation.

E. Field Conditions: Check field conditions and verify all measurements and relationships indicated on the drawings before proceeding with any work. In verifying existing conditions, the Contractor shall verify by direct physical inspection, complete tracing out of systems, by applying test pressures, by excavation and inspection, use of pipeline cameras, and other suitable absolute certain methods to confirm the actual physical conditions that exist.

F. Openings and Cutting and Patching in New Construction:
   1. Openings - General: The General Contractor shall provide all required spaces and provisions in structures of new construction for the installation of work of all other contractors or subcontractors.
   2. Coordination: The Contractors doing work subject to Division 20 shall furnish to the General Contractor (in a timely manner) all needed dimensions and locations of openings to allow for these openings to be provided as the construction adjacent to the opening is being done.
   3. Cutting and Patching: Cutting and patching of structures in place made necessary to admit work, repair defective work, or by neglect of contractors and subcontractors to properly anticipate their requirements, shall be done by the General Contractor at the expense of the contractors or subcontractors responsible. Work shall be done in a fashion to duplicate the results that would have been obtained had the work been properly sequenced.
   4. Patching Materials: Patching shall be with materials of like kind and quality of the adjoining surface by skilled labor experienced in that particular trade.

G. Openings and Cutting and Patching in Existing Construction:
   1. Openings--General: Provide all openings and cutting as needed to accommodate all work. Provide patching to restore all damaged and disturbed areas to pre-construction conditions (or better). The Contractor or subcontractor requiring the opening shall be responsible for making that opening. The opening shall be made by skilled labor experienced in providing openings in the material being penetrated.
   2. Areas To Be Cut and Patched: Wherever floors, walls, ceilings, plates, firestops and framing members are cut, these openings shall be substantially reinforced and sealed so as to maintain the strength and sealing ability of the element equal to that as if it had not been cut. All reinforcement/sealing shall satisfy the Architect/Engineer and comply with the governing codes. Such cut areas shall be patched and restored to a finished condition, equal to adjacent final finished areas that have not been cut.
   3. Cutting of Structural Features: Make no cuts or alterations to any structural framing members without explicit consent of the Engineer, and then only under his direction. Locate cuttings so they will not weaken structural components. Cut carefully and only the minimum amount necessary. All required cutting to install material shall be accomplished with the use of saw cutting equipment.

4. Patching Materials: Patching shall be with materials of like kind and quality of the adjoining surface by skilled labor experienced in that particular trade.

H. Cleaning: Clean all products (whether exposed to view or not) of all construction debris, and other materials; grease and oil spots shall be removed with appropriate cleaning agents and surfaces carefully wiped clean. Where cleaning cannot restore items to new conditions, the item shall be replaced with new.

3.2 INSTALLATION

A. General: Work shall be in accordance with manufacturer's written installation instructions, code, applicable standards, and best construction practices.

B. Space Verification: Prior to ordering materials verify that adequate space exists to accept the products, along the installation path, and to allow for proper maintenance access. Select products that will fit the space available; some optional materials (i.e. valve types, fitting types, substitutes manufacturer's etc.) may not be suitable. Verification shall be by direct field measurement of the actual space available and use of manufacturer's final submittal dimensions. Where the project involves new construction and long lead items and a time schedule not allowing for such direct field measurements, confirm in writing with all trades associated with building the space that adequate room is available. Review maintenance and service access space required and confirm requirements will be met. No submittals shall be made until such space verification work has been performed, and confirmed that adequate space is available. By virtue of making a submittal that Contractor affirms he has completed this verification.

C. Installation Locations:
1. General: Unless dimensioned locations for items are shown, select the precise location of the item in accordance with the Contract Documents, coordinated with other trades and item connection locations, and subject to the Architect/Engineer's review. No allowances will be granted for failure to obtain the Architect/Engineer's review, failure to coordinate the work, and failure to comply with Contract Document requirements.
2. Manually Operated Components: Valves, damper operators, on/off switches, keypads, controls, and other devices which are manually adjustable or operated shall be located so as to be easily accessible by a person standing on the floor adjacent to the item. Any such items which are not in the open shall be made accessible through access doors in the building construction. See individual specification sections for additional requirements.
3. Monitoring Components: Gauges, thermometers, instrumentation, and other components which display visual information (i.e. operating conditions, alarms, etc.), shall be located and oriented so as to be easily read by a person standing on the floor. Provide necessary brackets, hangers, remote read devices and accessories as needed. Equipment control panels and graphic displays furnished with equipment (or integral to equipment) shall be located to be easily accessible by a person standing on the floor adjacent to the equipment, and be located between 4-feet and 6-feet above the finished floor.
4. Installation Issues: If circumstances at a particular location make the accessible installation of an item difficult or inconvenient, the situation shall be discussed with the Architect/Engineer before installing the item in a location that will result in poor access.
5. ADA Accessibility: Locate items which are required to be ADA accessible in accordance with code (including but not limited to IBC, ICC A117.1 and local amendments) for accessibility; verify accessibility requirements with the AHJ.

D. Replacement and Maintenance: Install mechanical equipment to permit easy access for normal maintenance, and so that parts requiring periodic replacement or maintenance (e.g. coils, heat exchanger bundles, sheaves, filters, bearings, etc.) can be removed. Relocate items which interfere with access or revise item installation location, orientation, or means of access.

E. Building Access Doors:
   1. Access doors are typically not shown on the drawings; provide where indicated and where needed to provide access to valves, drains, duct access doors, equipment, control devices, dampers, and similar items requiring service or access that would otherwise be inaccessible. Provide access doors to allow for the future removal of items that would require the removal of permanent building construction (i.e. GWB ceilings, GWB walls, concrete construction, etc.)
   2. Select size, quantity, and locations of access doors. Review all drawings, construction materials, and work of other trades in determining access door requirements.
   3. Developed dimensioned locations where needed for use by other trades or for coordination purposes.
   4. Coordinate access door locations, size, and details with other trades.

F. Rotating Parts: Belts, pulleys, couplings, projecting setscrews, keys and other rotating parts which may pose a danger to personnel shall be fully enclosed or guarded in accordance with Code, and so as not to present a safety hazard.

G. Equipment Pads:
   1. Outdoors At Grade:
      a. General: All ground mounted mechanical equipment shall be installed on a concrete pad (unless indicated otherwise). Pad shall be minimum 4-inch thick, minimum 4" wider than the equipment all around. Set pad on minimum 6-inch gravel base, compacted to 95% density. Concrete shall be same as used for building footings (unless noted otherwise) and be placed in accordance with ACI standards.
      b. Where the largest dimension for any pad exceeds 4 feet or the equipment exceeds 300 lbs, provide pad with welded wire fabric (6-inch x 6-inch, No. 6), centered in pad.
      c. Where the largest dimension for the pad exceeds 6 feet or the equipment weight exceeds 400 lbs, see structural drawings.
      d. Freeze Protection: Where project location is subject to freezing water below the bottom of the pad depth, provide thickened perimeter edge to frost depth (unless written direction from a structural engineer or the soils report does not require such depth). Provide #4 re-bar 6" on center horizontal and vertical in thickened edge and both ways horizontally in main pad field (in lieu of WWR).

H. Dissimilar Metals: Provide separations between all dissimilar metals. Where not specified in another way, use 10 mil plastic tape wrapped at point of contact or plastic centering inserts.

I. Electrical Offsets: Provide offsets around all electrical panels (and similar electrical equipment) to maintain space clear above and below electrical panels to structure, and clearance of 3.5 feet directly in front of panel, except where indicated otherwise or required by code to be more. Such required offsets are typically not shown on the plans but are to be provided per this paragraph. Include in bid offsets for all systems near electrical panels.

J. Piping Through Framing: Piping through framing shall be installed in the approximate center of the member. Where located such that nails or screws are likely to damage the pipe, a steel plate at least 1/16-inch thick shall be installed to provide protection. At metal framing, wrap piping to prevent contact of dissimilar metals. At metal and wood framing, provide plastic pipe insulators at piping penetrations through framing nearest each equipment connection and on at least 32-inch centers.

K. Safety Protection: All ductwork, piping and related items installed by this Contractor that present a safety hazard (i.e., items installed at/near head height, items projecting into maintenance access paths, etc.) shall be covered (at hazardous area) with 3/4" thick elastomeric insulation and reflective red/white self-sticking safety tape. All sharp corners on supports and other installed items shall be ground smooth.

L. Equipment Access: Access to equipment is of utmost importance. Contractor shall apply extra attention to the location of pipe and duct routings and in coordinating all work so that equipment access and a clear maintenance pathway to equipment is maintained. Poor maintenance access will not be accepted. Contractor shall note that in essentially all areas piping and ducts need to run with slopes parallel to the roof (or floor above), in necessitating elbows/fittings/transitions at crosses of ducts/pipes and at all connections to mains and branches; and requiring added fittings to maintain a clear walking path.

M. Pressure Tests: Maintain documentation of all pressure (and leakage) tests performed on systems and submit with project closeout documents. Records shall contain (as a minimum): date of test, system name, description portion of system being tested, method of test, initial and final test pressures (or of measured leakage rates, as applicable), indication of test pass or fail, name and signature of individual performing (or documenting) the test, initials of independent witness of test.

N. Comfort Adjustments:
1. Review and Identification: During balancing work, during start-up, after start-up, and after Owner occupancy review system operation with balancer, system installers, controls installer, commissioning agent, Owner’s staff, and Architect/Engineer areas with comfort issues or possible comfort issues. Review to determine and identify causes and develop resolutions. Provide list with suggested resolutions.
2. Adjustments: Make adjustments in equipment control settings, equipment operation, air flow rates, water flow rates, vibration isolation devices, air outlet patterns, and related aspects in order to optimize each space's comfort. Comfort considerations include space temperatures, rate of change of space temperatures, control system response time, drafts, space pressurization, noise, vibration, equipment cycling (and associated changes in noise/vibration) and similar aspects. Where such adjustments involve changes from design direction, review and obtain approval from the Architect/Engineer prior to implementing.

3.3 PAINTING

A. General: Painting shall comply with Division 09 specifications regarding painting Colors, in all cases, shall be as selected by the Architect/Engineer. Color samples shall be submitted to the Architect/Engineer for approval prior to painting.

B. The following painting shall be provided under Division 20:

1. All exposed metallic surfaces (includes piping, ducts, hangers, conduits, etc.) provided by this Contractor (except equipment with factory finish or items specifically excluded) shall receive one coat of rust inhibiting primer and two (2) coats of selected finish paint.
2. All exposed insulated surfaces provided by this Contractor (except where specifically excluded) shall receive one coat of primer and two coats of selected finish paint.
3. The inside of all ductwork (including visible dampers, roof vents, insulation pins, and any visible metal) behind grilles, registers, diffusers, and louvers shall be painted flat black.

C. Items to be painted under Division 09:
1. Exposed duct work in finished areas.
2. Exterior mechanical equipment.
3. Exposed piping in finished areas.

3.4 PENETRATION PROTECTION

A. Exterior and Watertight Penetrations: Where any work pierces the building exterior (or construction intended to be watertight) the penetration shall be made watertight and weatherproof. Provide all necessary products (e.g. caulking, flashing, screens, gaskets, backing materials, siding, roofing, trim, etc.). Where not detailed or indicated how to install submit shop drawings of the proposed methods. Flashing arrangements shall be per SMACNA Architectural Sheet Metal Manual unless noted otherwise. Caulking alone is not an acceptable means of sealing penetrations.

B. Equipment: Equipment or products located outdoors shall be watertight (except for provisions designed to intentionally accept water and having drain provisions) and shall be designed and intended by the manufacturer to be used outdoors at the project location. Where any work pierces the unit casing exposed to the outdoors the penetration shall be made watertight and weatherproof; provide all necessary products (e.g. caulking, flashing, gaskets, backing materials, etc.).

3.5 START-UP

A. General: Provide inspections, start-up and operational checks of all mechanical systems and equipment. Maintain documentation of all start-up work and submit with project closeout documents. See individual specification Sections for additional requirements.

B. Personnel: Inspection and start-up services shall be done by individuals trained in the operation, and knowledgeable with, the systems being started-up. Equipment start-up shall be by the manufacturer's authorized service representative where indicated (see individual specification Sections).

C. Scheduling and Agenda: Submit a proposed detailed start-up schedule with proposed dates and times at least 30 days prior to the earliest proposed system start-up. Revise dates and times as mutually agreed upon with trades involved, and witnesses, before submitting a final start-up schedule.

D. Witnessing: Start-up may be witnessed by the Engineer and Owner's representative (at their option). Notify the Engineer and Owner 7 days prior to the proposed start-up time.

3.6 OWNER INSTRUCTION

A. General: Provide instruction to the Owner on the operation and maintenance of all installed mechanical systems.

B. Personnel: Instruction on the operation and maintenance of products shall be by individuals trained and experienced in the installation, operation and maintenance of these products. Instruction shall be by the product manufacturer's authorized service representative where indicated (see individual specification Sections).

C. Scheduling and Agenda: Submit a proposed instruction schedule (with proposed dates and times) and an instruction agenda at least 30 days prior to the earliest proposed instruction period. Coordinate Owner and Architect/Engineer review and arrange mutually agreed upon instruction schedule and the instruction agenda, and submit a final instruction schedule and agenda. Organize instruction by sub-systems corresponding to the project specifications (or similar logical grouping).

D. Instruction: Demonstrate and explain normal start-up, normal shut-down, normal operation, normal settings, adjustments, signs of abnormal operation, emergency shut-down, safety concerns, and related information. Demonstrate and explain system maintenance requirements with references to the O&M Manual. Show how maintenance is performed, including how items are accessed, maintenance procedures, tools and parts required, and related information. Review typical repairs and explain how performed.

END OF SECTION

SECTION 200529 – HANGERS AND SUPPORTS FOR MECHANICAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.

B. Requirements of Section 20 05 00 apply to this Section.

1.2 WORK INCLUDED

A. Pipe Hangers and Supports.

B. Duct Hangers and Supports.

C. Mechanical Equipment Anchors and Supports.

1.3 QUALITY ASSURANCE

A. Pipe Hanger Standards: Manufacturers Standardization Society (MSS) Standards SP-58, SP-89, SP-69, and SP-90.

B. General: All methods, materials and workmanship shall comply with Code; including IBC, IMC, UPC, NFPA Standards, and ASME standards.

1.4 SUBMITTALS

A. General: Submittals shall comply with Section 20 05 00.

B. Product Data: Submit product data for all hangers, supports, and anchors. Data to include finish, load rating, dimensions, and applicable agency listings. Indicate application for all items by system type, size, and other criteria as appropriate to project.

C. Shop Drawings:
1. General: Shop drawings shall clearly indicate dimensions, anchor and support type, anchor and support size, anchor and support spacing, finish, configuration, and systems/equipment to be applied to.
2. Fabricated Supports: Submit shop drawings for all fabricated supports.

1.5 GENERAL REQUIREMENTS

A. Seismic: Provide adequate hangers, supports, anchors, and bracing to serve as seismic restraints. Seismic anchoring and bracing methods shall comply with SMACNA SRM, Mason SRG, and

code. Seismic restraints system shall be able to withstand seismic forces as required by code; provide seismic restraint calculations as required by the AHJ.

B. Design and Manufacture: All pipe hangers and supports shall be designed and manufactured in accordance with MSS-SP 58.

1.6 REFERENCES

A. ADC: Air Duct Council - Flexible Duct Performance and Installation Standard, 5th Edition.

B. ASHRAE-F: American Society of Heating, Refrigeration, and Air Conditioning Engineers, Handbook of Fundamentals.

C. ASME B31.1: Power Piping.

D. ASME B31.9: Building Services Piping.

E. ASTM A36: Standard Specification for Carbon Structural Steel.

F. ASTM A108: Standard Specification for Steel Bar, Carbon and Alloy, Cold - Finished.

G. ASTM A123: Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

H. ASTM A153: Standard specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

I. ASTM A653: Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc Iron Alloy-Coated (Galvannealed) by the Hot Dip Process.

J. ASTM A907: Standard Specification for Steel, Wire, Epoxy - Coated.

K. ASTM A924: Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot Dip Process.

L. IBC: International Building Code.

M. IMC: International Mechanical Code.

N. Mason SRG: Mason Industries Seismic Restraint Guidelines for Suspended Piping, Ductwork, Electrical Systems and Floor Mounted Equipment, 6th Edition.

O. MSS SP-58: Pipe and Hangers and Supports - Materials, Design and Manufacture.

P. MSS SP-69: Pipe and Hangers and Supports - Selection and Application.

Q. MSS SP-89: Pipe Hangers and Supports - Fabrication and Installation Practices.

R. MSS SP-90: Guidelines on Terminology for Pipe Hangers and Supports.

S. SMACNA-DCS: HVAC Duct Construction Standards, 3rd Edition.

T. SMACNA SRM: Seismic Restraint Manual Guidelines for Mechanical Systems, 2nd Edition.

U. UPC: Uniform Plumbing Code.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Products shall comply with Section 20 05 00, Paragraph 2.1, Acceptable Manufacturers.

B. Hangers and Supports: Grinnell, B-Line Systems, Unistrut, Erico, PHD, Basic-PSA, Pate, Caddy, Unisource, Metraflex, American Insulation Sales, Thermal Pipe Shields, Miro Industries, Holdrite.

C. Anchors: Rawplug, Phillips, Hilti, Michigan, Simpson, Fastenal, Red Head, Grinnell, B-Line Systems, Unistrut, PHD, Basic-PSA, Metraflex.

2.2 GENERAL

A. Finish:
1. Indoor Applications: Electro-plated zinc in accordance with ASTM B 633, or hot-dip galvanized after fabrication in accordance with ASTM A 123; except that hanger straps may be formed from pre-galvanized steel.
2. Outdoor Applications: Hot-dip galvanized after fabrication in accordance with ASTM A 123, ASTM A 153, or ASTM A 653 (as applicable to item).

B. Identification: Steel pipe hangers and supports shall be stamped with the manufacturer's name, part number, and size.

C. Hanger Rods: Threaded hot rolled steel. Hanger rods shall be sized so that the total load imposed (including pipe or duct, insulation, hangers, and fluid) does not exceed the following:

Nominal Rod Diameter	Maximum Load
1/4 Inch	240 Pounds
5/16 Inch	440 Pounds
3/8 Inch	610 Pounds
1/2 Inch	1130 Pounds
5/8 Inch	1810 Pounds
3/4 Inch	2710 Pounds
7/8 Inch	3770 Pounds
1 Inch	4960 Pounds

D. Hanger Straps: Galvanized steel, minimum 1" x 22 gauge (except where required by Code to be heavier or noted otherwise), of lock-forming grade conforming to ASTM A924, G90 (minimum) galvanized coating conforming to ASTM A 653. Minimum yield strength of 30,000 psi. Straps shall be sized so that the total load imposed does not exceed the following:

Strap Size	Maximum Load

1” x 22 Gauge	230 Pounds
1” x 20 Gauge	290 Pounds
1" x 18 Gauge	380 Pounds
1" x 16 Gauge	630 Pounds
1-1/2" x 16 Gauge	990 Pounds

E. Concrete Anchors: Wedge type expansion anchors, with hex nut and washer, and stainless steel split expansion rings. Tested to ASTM E 488 criteria, UL listed, with exposed anchor head stamped with code to identify anchor length.

F. General Anchors (Screws, Nuts, Bolts, Fasteners):
1. General: Constructed of materials suitable for the conditions exposed to and materials being joined, with minimum 50 year service life. Stainless steel construction where exposed to corrosive conditions. Configuration, size and grade to suit application, accommodate expected forces, and provide anchoring to structural element (or allow for proper fastening of items). Minimum safety factor of 2.5 (or as required by code, whichever is greater). Comply with ASTM A307, SAE J429, SAE J78, or ASTM A 563; bolts and nuts shall have unified inch screw threads (course, UNC).
2. Test Reports: Provide independent test report indicating fastener strength (pullout and shear) as installed in the materials and applications of this project (when required by the Engineer or AHJ).
3. Finish: In finished areas, the portion of fastener exposed to view shall match the exposed finish of item being fastened.

G. Manufactured Strut Systems:
1. Channels: Minimum 12 gauge, 1-5/8 x 1-5/8" (unless noted otherwise), with slots/holes to suit application
2. Accessories: Channel nuts press formed, machined and hardened with gripping slot, fabricated from steel conforming to ASTM A 108 or ASTM A 36. Fittings fabricated from steel in accordance with ASTM A 907.
3. End Caps: Vinyl cap, capable of withstanding high temperatures without degradation, manufactured specifically for use with manufactured strut. Unistrut Series P2859 or P2860 (or approved).

H. Steel: Structural steel per ASTM A 36

I. Wood: Only allowed to be used where building structural elements are of wood construction same type, grade used for building structural members. Where located outdoors shall be the pressure treated type; with all cut portions of wood painted with wood preservative.

J. Field Galvanizing Compound: Brush or spray applied galvanizing treatment; consisting of a premixed ready to apply liquid organic zinc compound, with 95% metallic zinc content by weight in dry film. ZRC worldwide “ZRC Cold Galvanizing Compound”.

2.3 PIPE HANGERS AND SUPPORTS

A. Copper Pipe: All hangers used directly on copper pipe shall be copper plated or have a factory applied 1/16-inch thick (minimum) plastic coating on all contact surfaces.

B. Type: Shall be MSS type selected in accordance with MSS-69; except that MSS type 24, 26, and 34 shall not be used.

C. Trapeze Hangers: Shall be constructed of carbon steel angles, manufactured strut channels, or other structural shapes with flat surface (or installed saddle) for pipe support. Provide steel washer where hanger rod nuts bear on trapeze hanger. Pipe anchors shall be two piece clamp type designed for use with trapeze style (i.e. inserted into strut channel opening) or one piece type designed for welded or bolted attachment to trapeze; shaped to match pipe size (or pipe size plus insulation thickness on insulated systems). Pipe guides shall comply with paragraph titled "Alignment Guides"; or be steel angles with vertical leg height equal to pipe diameter (or pipe diameter plus insulation thickness on insulated systems); or be two piece clamp type pipe anchors sized and installed to serve as a guide.

D. Alignment Guides: Steel "spider" type alignment guides, with anchoring legs. Provide with calcium silicate insulation where used on cold pipe lines. Metraflex "Style IV", "PG-PRE" (or approved).

E. Pipe Anchors - Expansion: For use on pipe runs having expansion/contraction devices.
   1. Contractor Fabricated: Anchors shall consist of riser clamp and welded pipe or steel angles anchored to structure, or similar arrangement (unless indicated otherwise). Provide with calcium silicate insulation insert rated for 900 psi compressive strength, and vapor barrier where used on cold pipe lines.
   2. Factory Fabricated: Carbon steel anchors to force pipe expansion into system expansion/contraction devices, with paint finish. Provide with calcium silicate insulation insert rated for 900 psi compressive strength, and vapor barrier, where used on cold pipe lines. Metraflex "PA", "PAPI" (or approved).

2.4 DUCT HANGERS AND SUPPORTS

A. Hangers: As shown in SMACNA-DCS except that wire shall not be used and all materials used shall comply with these specifications.

B. Vertical Duct Supports at Floor: 1-1/2" x 1-1/2" x 1/8" (minimum) galvanized steel angle and to support ducts, maximum 12 foot on center, and as shown in SMACNA-DCS.

C. Vertical Duct Supports at Wall: 1-1/2" x 1/8" (minimum) strap or 1-1/2" x 1-1/2" x 1/8" (minimum) angle bracket and as shown in SMACNA-DCS.

D. Hanger Attachments to Structure: As shown in SMACNA-DCS to suit building construction and as allowed on structural drawings. Provide washers at all fasteners through hanger straps (regardless of SMACNA-DCS allowances). Where C-clamps are provided, retainer clips shall be used. Friction beam clamps shall not be used.

E. Hanger Attachments to Ducts: As shown in SMACNA-DCS except that wire shall not be used as any form of support or attachment for ducts.

F. Flexible Duct Strap: Woven polypropylene hanging strap, minimum tensile strength of 400 lbs, minimum 1.75-inches wide, designed and intended for flexible duct support.

PART 3 - EXECUTION

3.1 INSTALLATION - GENERAL

A. General: Provide all necessary bolts, nuts, washers, fasteners, turnbuckles, hanger rods, rod connectors, stanchions, wall/roof/floor backing and attachments, bridging between structural members, and any other miscellaneous accessories required for the support and anchoring of all pipes, ducts, and mechanical equipment. All supports, whether from floor, walls, or hung from structure, are Contractor's responsibility. Anchors and supports shall be adequate to accommodate forces equipment will be exposed to. Any field cut pieces of galvanized materials shall be hot-dip galvanized after cutting; or be solvent and wire brushed clean and receive field applied galvanizing treatment. This field applied galvanizing (only allowed with prior permission for minor localized cuts) shall use multiple coats to provide as near equal protection as possible to factory (or hot-dip) applied coatings.

B. Backing: Install steel or wood backing in walls (anchored to studs) and in ceiling (anchored to joists or trusses), as required to provide support for items.

C. Installation: Install all inserts, anchors, and supports in accordance with manufacturer's instructions, code requirements, and best professional practices. The most restrictive criteria governs.

D. Welded Assembly Finish: All welded steel support assemblies shall have a power wire brush and primer paint finish where installed indoors and be have factory applied hot-dip galvanized finish where installed outdoors (or subject to moisture); unless another finish is specified.

E. Attachments: Attach to anchoring element (i.e. building structure, concrete pads, etc.) as shown on drawings (reference structural drawings). Where not detailed on the drawings, the Contractor shall design and submit shop drawings of proposed attachment methods to the Engineer for review.

F. Application:
   1. Where not detailed on the drawings (or otherwise indicated), the selection and design of supports is the Contractor’s responsibility, in compliance with code and Contract Document requirements; subject to submittal review and acceptance by the Engineer.
   2. Exposed supports in finished areas shall be arranged to minimize their visibility; be free of dents, scratches and labels, and be configured in a manner to match the decorum and finish of the room they are installed in. Exposed supports in finished areas shall be cleaned to allow for field painting (unless a chrome, stainless steel, or similar finish has been indicated).
   3. HVAC Support wire and flexible duct strap shall only be used for support of ceiling air inlets and outlets, or at flexible duct supports.

G. Manufactured Strut (“Unistrut”): Provide end caps on all strut ends at the following locations:
   1. Where exposed to view in finished areas.
   2. Where near maintenance access paths.
   3. Where personnel injury could occur if the ends were not covered.

H. Seismic: Provide hangers, supports, anchors and bracing as required by code and as necessary to accommodate forces in a seismic event. Seismic bracing is not required for piping sized 2-inch

and less, or for horizontal piping where the distance from the top of the pipe to the support attachment point to the building structure is less than 12-inches (unless noted otherwise). Seismic bracing is not required for ductwork less than 28-inch in diameter or having across sectional area less than 6 square feet, or for horizontal ductwork where the distance from the top of the duct to the support attachment point to the building structure is less than 12-inches (unless noted otherwise). All equipment shall be seismically anchored.

I. Building Structural Loads: Where installed items incur loads that exceed the building's structural capacity (i.e. the carrying capacity as indicated on the drawings or otherwise noted in the documents), provide support types to transmit the loads to floors or other parts of structure that can carry load (e.g. bridging between joists to distribute load, added structure between walls to allow walls to carry load, etc.). Such supports shall consist of all welded steel angle iron supports, pipe columns, or similar custom fabricated items. Provide with base plates, U bolts, or similar type accessories to allow proper anchoring and seismic hold-down for all items supported. Maximum spans between supports may be significantly less than the maximum spans allowed by code or by manufacturers due to limitations of allowable loads on building members; reference limitations indicated on the drawings (or otherwise noted in the documents); the most restrictive criteria governs.

3.2 INSTALLATION OF PIPE HANGERS AND SUPPORTS

A. General: Aboveground pipe shall be anchored to the structure to prevent sagging, to keep pipe in alignment, and to resist the forces the pipe will be exposed to; piping shall be supported independent of equipment so that no loads bear on the equipment.

B. Adjustment: All pipe supports shall be provided with a means of adjustment for the aligning and leveling of the pipe after installation.

C. Applications: Selection, sizing, and installation of pipe supports and accessories shall be in accordance with the manufacturers recommendations, standards MSS SP-89 and MSS SP-69, UPC, and IMC. Refrigerant piping and similar piping subject to vibration (i.e. high pressure tubing) shall be installed with cushion clamps.

D. Support Spacing: Provide piping support spacing according to the most restrictive of the following: UPC, IMC, ASME B31.1, B31.9, local codes, manufacturers recommendations or Contract Documents specific requirements. Provide supports at each change in direction of piping and at each side of concentrated loads (such as in-line pumps, valves greater than size 5", and similar items).

E. Trapeze Hangers: Multiple parallel pipes may be supported on trapeze hangers provided the slopes of such pipes allow use of common trapeze. Suspend trapeze hanger from the building structure using hanger rods; attach to the building structure using concrete inserts, beam clamps, or other approved methods. Where trapeze width exceeds 30 inches, and where building attachment restrictions require more anchor points, provide three (or more) hanger rod supports. Provide pipe anchors to secure piping to trapeze on minimum 20 foot spacing; size and install pipe anchor to allow longitudinal movement of pipe (unless noted otherwise) with minimal vertical and transverse movement; where pipe is subject to expansion/contraction provide anchoring and alignment guides per paragraph titled "Thermal Expansion/Contraction".

F. Vertical Piping Supports: Support piping at each floor line with pipe clamps and at intermediate points as required so that hanger spacing does not exceed allowable spacing and as required to prevent excessive pipe movement and so as to comply with the maximum spacings cited above. Support all pipe stacks at their bases with a concrete pier or suitable support. For vertical pipe drops which occur away from a wall or similar anchoring surface, provide angled bracing from nearest structure on two sides of drop to provide rigid anchoring of pipe drop.

G. Insulated Pipe Supports:
1. Insulation Inserts and Shield Required: Protect all insulated pipe at point of support with pre-insulated pipe supports. Such supports shall be in place at time of installing pipe.
2. Shield Only Required: Provide shield under insulated pipe at support points.

H. Underground Pipe: Shall be evenly supported on approved bedding materials, as appropriate for the type of piping being used. Such bedding and backfilling shall be as specified in Section 20 05 90.

3.3 INSTALLATION OF DUCT HANGERS AND SUPPORTS

A. General: Provide anchors and supports for all ductwork. Supports and hangers shall comply with SMACNA-DCS, except that hanger spacing and hanger maximum loads shall be governed by whichever is more restrictive between these specifications or SMACNA-DCS.

B. Hanger Spacing -- Rectangular Duct:

Duct Area	Maximum Spacing
Up to 4 Square Feet	8 Feet

C. Hanger Spacing -- Round Duct:

Duct Area	Maximum Spacing
Up to 24 Inch Diameter	8 Feet

D. Hanger Spacing - Flexible Duct: 4 feet, and at changes of direction as needed to maintain duct elevation and smooth airflow.

E. Vertical Ducts: Support at each floor level, but in no case less than on 12 foot intervals.

F. Flexible Duct: Support with methods shown in ADC. Metal strap in contact with the flexible duct shall have minimum 1.5-inch width.

G. Fittings: Provide supports at each change in direction of duct for ducts with 4 square foot area or more, or for ducts larger than 24 inch diameter. Locate hangers at inside and outside corners of elbows--or at each end of fitting on each side.

H. Concentrated Loads: Provide additional supports at each side concentrated loads such as modulating dampers (24" x 24" and larger), duct heaters (18" x 18" and larger), sound attenuators (all sizes), and similar items.

I. Exterior Duct: Provide supports for exterior ductwork as shown in SMACNA-DCS; spacing as specified herein.

J. End of Duct: At end of duct run, hanger shall be located no more than 1/2 the allowed hangar spacing from the end of the run.

3.4 MECHANICAL EQUIPMENT ANCHORS AND SUPPORTS

A. General: Provide anchoring and supports for all mechanical equipment. All equipment shall be anchored to (or supported from) the building structure. In lieu of anchoring to the building, anchor outdoor equipment to the concrete pad serving the equipment.

B. Suspended Equipment: Support as indicated on the plans. Where not indicated use the methods shown (or consistent with) Mason SRG and SMACNA-DCS; submit shop drawings of the proposed methods to the Engineer for review.

C. Roof Mounted Equipment: Install on roof curbs or roof sleepers as indicated. Anchor equipment to the curb (or sleeper), with the curb (or sleeper) in turn anchored to the building structure.

D. Vibration Isolation: Equipment shall be supported and anchored in such a way so that no equipment vibration is transmitted to the building structure.

E. Seismic: Coordinate with requirements of Paragraph 3.1H above; provide anchors and bracing to resist seismic forces.

END OF SECTION

SECTION 200590 – UNDERGROUND UTILITIES EXCAVATION AND FILL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.

B. Requirements of Section 20 05 00 apply to this Section.

1.2 WORK INCLUDED

A. Excavation.

B. Trenching.

C. Shoring and Trench Protection.

D. Bedding.

E. Backfilling.

F. Compaction.

G. Verification of Existing Utilities.

H. Protection of Utilities.

I. Dewatering.

J. Identification Warning Tape.

1.3 DEFINITIONS

A. “Utility Bedding” is defined to mean “material placed beneath the utility for utility support, and material placed adjacent to the utility to the centerline of the utility.”

B. “Utility Zone Backfill” is defined to mean “backfill material that is placed in the area from the centerline of the utility up to the specified height above the top of the utility, and is located above the utility bedding and below the final backfill material.”

C. “Trench Backfill” is defined to mean “backfill material that is placed above the utility zone backfill, and up to rough or finished grade.”

D. “Underground Mechanical Structures” are defined to mean “vaults, tanks, interceptors, separators, manholes, and similar structures buried partially or completely underground.”

E. "Unstable Material" is defined to mean "material that depresses more than 1/4-inch under a load of 2000 pound/square foot, is not firm and stable, or in any way appears incapable of supporting the loads to be imposed."

1.4 QUALITY ASSURANCE

A. Inspection of Job Conditions: Prior to starting work and during work, the installer shall examine the work by others, site and job conditions under which excavation, trenching, and backfilling for underground mechanical utilities work will be performed, and not proceed with work until unsatisfactory conditions have been corrected.

B. Codes and Standards: Comply with all applicable codes and standards. Grading of materials shall be done in accordance with ASTM C136 or WSDOT Standards (unless noted otherwise).

C. Experience: Only contractors fully experienced and entirely knowledgeable in the type of work required shall work on this project. By providing bids for this project the Contractor is acknowledging that he has such expertise, and will staff the project with personnel experienced and knowledgeable in the work to be performed.

D. Compaction Testing: Retain a certified testing laboratory to perform compaction testing on all backfilled areas to confirm that the material has been compacted to the specified density (shall be 95% unless indicated otherwise) in accordance with WSDOT Standard Specifications 2-03.3 (14).

1.5 GENERAL REQUIREMENTS

A. Safety: Contractor is solely responsible for worker safety and for selecting and designing all trench shoring methods, trench protection methods, site utility protection means and other aspects of the work. All such means, methods, and safety measures shall comply with applicable codes and standards, and the requirements of the Contract Documents.

B. Coordination: Coordinate all work with other trades. Coordinate with other Divisions the location and termination of all work of other trades and interconnections with Division 20 work.

C. Scheduling: Schedule work to avoid impacts to other trades due to open trenches, dewatering, and other activities.

D. Existing Utilities: Verify location of all existing utilities that lay in the route of intended work. Verify the location of all existing utilities that will be connected to prior to beginning work for any new utilities.

E. Discrepancies: Notify the Architect/Engineer of any discrepancies or conflicts within the Contract Documents or between the Contract Documents and field conditions. Do not proceed with any work or purchasing of any materials for the area(s) of conflict until obtaining written instruction from the Architect/Engineer on how to proceed. Any work done after discovery of such discrepancies or conflicts and prior to obtaining the Architect/Engineer's instructions on how to proceed, shall be done at the Contractor's expense. In case of a conflict between Division 20 requirements and other project requirements, the most stringent and expensive (as judged by the Architect/Engineer) shall prevail.

1.6 REFERENCES

A. ASTM C136: Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

B. ASTM D1557: Laboratory Compaction Characteristics of Soil Using Modified Effort.

C. ASTM D2419: Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate.

D. ASTM D2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System).

E. WSDOT Standard Specifications: Washington State Department of Transportation, Specifications for Road, Bridge, and Municipal Construction.

PART 2 - MATERIALS

2.1 GENERAL MATERIALS

A. General: All materials used for bedding, backfill, and drainage purposes shall be free of debris, roots, wood, vegetation, refuse, soft unsound material, frozen material, deleterious or other objectionable material.

B. Sand: Clean, free flowing, coarse grade sand, with sand equivalent per ASTM D2419 of 25 (minimum), and meeting the following for grading:

Sieve Size	Percent Passing (By Weight)
3/8" Square	100
U.S. No. 4	90-100
U.S. No. 50	10-40
U.S. No. 100	3-15
U.S. No. 200	0-7

C. Pea Gravel: 3/8-inch washed pea gravel; durable particles composed of small, smooth, rounded stones or pebbles meeting the following for grading and quality:

Sieve Size	Percent Passing (By Weight)
1/2" square	100
3/8" Square	85-100
5/8" Square	50-100
U.S. No. 4	10-30
U.S. No. 8	0-10
U.S. No. 16	0-5

2.2 BEDDING MATERIALS

A. Standard: Gravel backfill material, with characteristics of size and shape to allow for compaction, no dimension exceeding 1-1/2 inches, and meeting the following for grading and quality:

Sieve Size	Percent Passing (By Weight)
1-1/2" Square	100
1" Square	75-100
5/8" Square	50-100
U.S. No. 4	20-80
U.S. No. 40	3-24
U.S. No. 200	10.0 max.
Sand Equivalent	35 min.

B. Special: Pea gravel or sand (per paragraph titled “General Materials”).

C. Bedding Material Application:

Utility	Bedding Material	Minimum Thickness*
Cast Iron Piping	Standard (or Special)	4"
Steel Piping/Conduit	Standard (or Special)	4"
Ductile Iron Piping	Sand (or Special)	4"
Plastic Piping/Conduit	Sand	4"**
Conductors/Cable	Special	4"

* Below bottom of utility (unless noted otherwise).
**Except that HDPE piping shall use sand bedding with minimum 6-inch thickness (unless noted larger elsewhere).
.

2.3 UTILITY ZONE BACKFILL MATERIALS

A. Standard: Same as specified for standard bedding materials.

B. Special: Minus 3/8"-inch washed gravel, or sand.

C. Utility Zone Backfill Material Application:

Utility	Backfill Material Thickness***	Minimum
Cast Iron Piping	Standard (or Special)	4"
Steel Piping/Conduit	Standard (or Special)	4"
Ductile Iron Piping	Standard (or Special)	4"
Plastic Piping/Conduit	Sand	4"****
Conductors/Cable	Special	4"

*** Above top of utility (unless noted otherwise).
****Except that HDPE piping shall use sand backfill with minimum 6” thickness above utility (unless noted larger elsewhere).

2.4 PIPE TRENCH BACKFILL

A. Standard: Gravel backfill material, with size and shape to allow for compaction, no dimension exceeding 3 inches, and meeting the following:

Sieve Size	Percent Passing (By Weight)
2-1/2" Square	75-100
U.S. No. 4	22-100
U.S. No. 200	0-10
Dust Ratio	2/3 max.
Sand Equivalent	30 min.

B. Satisfactory Native Material: Excavated material from trenching (or other excavation on site), complying with 2.1 A., having no clods or rocks greater than 3 inches in any dimension.

C. Material Application: Either standard or satisfactory native materials may be used (unless noted otherwise).

2.5 GENERAL BACKFILL MATERIALS

A. Utility Foundation Backfill: Class A per WSDOT 2014, 9-03.12 (1) A.

B. Drain Backfills: Gravel backfill for drains shall conform to the following gradings:

Sieve Size	Percent Passing (By Weight)
1" Square	100
3/4" Square	80-100
3/8" Square	10- 40
U.S. No. 4	0-4
U.S. No. 200	0-2

C. Conductors/Cables/Raceway: Excavated material from trenching (or other excavation on site), complying with 2.01 A. (from top of utility zone backfill layer up to rough or finished grade).

2.6 BURIED UTILITY WARNING AND IDENTIFICATION TAPE

A. General: Polyethylene plastic tape manufactured specifically for warning and identification of buried utility lines. Tape shall be minimum 6" wide, acid and alkali resistant.

B. Detectable Type: Minimum 0.004 inch thick, with integral wire, foil backing, or other means to allow detection of tape location. Encase metallic element in protection jacket or other means to provide corrosion protection.

C. Labeling: Tape shall be imprinted with bold black capital letters continuously and repeatedly over the entire tape length. Warning shall read “CAUTION BURIED (utility type) BELOW” or similar wording. Lettering identifying the utility type shall match as closely as possible the

designation noted on the plans. Tape lettering shall be permanent and be unaffected by moisture or other materials contained in trench backfill.

D. Tape Colors:

Utility	Color
Electric	Red
Sewer	Green
Water	Blue

PART 3 - EXECUTION

3.1 GENERAL

A. Shoring and Trench Protection: Contractor is responsible to design and provide all necessary trench shoring and trench protection to:
1. Provide safe conditions.
2. Provide conditions that comply with applicable codes and AHJ requirements.
3. Prevent undermining of pavement, foundation, slabs, utilities, and other structures.
4. Prevent movements in adjacent slopes or banks.

B. Workmanship: Work shall abide by best professional practices as described in referenced standards, and as recognized by accredited professionals.

C. Compaction: Provide compaction to percent indicated per ASTM D 1557, of laboratory maximum density. Compact to 95 percent (unless noted otherwise). Compaction shall be accomplished by approved tamping rollers, pneumatic-tired rollers, three-wheel power rollers, or other approved compaction equipment.

D. Grading: Provide grading to prevent surface water from flowing into areas of work to maintain the stability of the work area, and suitable working conditions.

E. Dewatering: Provide dewatering system for the collection and disposal of surface and subsurface water encountered during construction in order to maintain conditions suitable for the work. Provide all pits, drainage conveyances, pumps, dikes, etc. as required to accomplish the work.

F. Underground Utilities: Location of utilities indicated is approximate. Verify the location of all existing utilities prior to beginning work; utilize field electronic detection equipment, pipe cameras, visual site surveys, and careful exploratory digging at key locations. Coordinate with other trades routing and locations of all new utilities to avoid conflicts and ensure proper connections.

G. Machinery and Equipment: Movement of construction machinery and equipment over buried and backfilled pipes during construction shall be at the Contractor’s risk. Repair, or remove and provide new pipe for existing or newly installed pipe that has been displaced or damaged. Pressure testing of piping before final Owner acceptance is required to verify no damage has occurred.

H. Protection: Protect all areas of work from traffic, erosion, weather, settlement or other damaging effects. Protect all existing utilities from damage.

I. Jacking, Boring and Tunneling: Unless otherwise indicated, excavation shall be by open cut, except that sections of a trench may be jacked, bored or tunneled if the utility can be safely and properly installed and backfill can be properly tamped in such sections.

J. Buried Warning and Identification Tape: Provide buried utility lines with utility identification tape. Bury tape 12 inches below finished grade. Provide detectable type over non-metallic piping systems. Piping systems installed within the building footprint do not require identification tape.

3.2 EXCAVATION - GENERAL

A. General: Provide all excavation as necessary to allow for the work indicated. Excavations for underground mechanical structures shall be sufficient to provide a minimum of 12 inches clearance between their surfaces and the sides of the excavation.

B. Excavated Material:
1. Stockpiles: Stockpile materials satisfactory for backfilling in an orderly manner at a safe distance from the excavation to avoid overloading the sides of the excavated area and to prevent slides or cave-ins.
2. Protection: Protect stockpiles from contamination with unsuitable backfill materials. Provide adequate drainage at stockpiled areas to prevent water retention in material. If the Contractor fails to protect the stockpiles and any material becomes unsatisfactory as a result, such material shall be removed and replaced with satisfactory on-site or imported material from approved sources at no additional cost to the Owner.
3. Disposal: Excavated material not required or not satisfactory for backfill or other uses on site shall be removed and disposed off site.

3.3 TRENCH EXCAVATION

A. General: Excavate trenches to accommodate utility, required utility slopes, depths of connecting utility, existing and new utilities, required cover depth, and site conditions.

B. Removal of Unsuitable Material:
1. Unstable Material: Where unstable material is encountered in the bottom of the trench, such material shall be removed by over excavation of the trench bottom 4 inches below the depth otherwise required. Contractor is responsible for all costs associated with removal and replacement of unstable materials. For bidding purposes, assume that a minimum of 10% of all excavated bottom utility bearing areas will have unstable material.
2. Rocks and Stones: Stones of 6 inches or greater in any dimension, and any rock or stone of any size/orientation that may disrupt the pipe bedding thickness or pipe supports shall be removed. Rock shall be removed to 4 inches below the bottom of the pipe bearing elevation.
3. Other: Any wood, refuse, waste, organic material, or other material which would adversely affect pipe support shall be removed. For bidding purposes, assume that 5% of all trench bottom area will have objectionable material as described in this paragraph.

4. Replacement Material: Replace removed unsuitable material with "Utility Foundation Material" as specified under paragraph titled "General Backfill Materials", or with bedding material specified for the piping to be placed in the trench.

C. Bottom Preparation: Bottoms of trenches shall be accurately graded to provide uniform bearing and support for each section of pipe (or other utility) after bedding placement, and proper slope of piping.

D. Depth: Trench shall be adequate to provide a minimum depth of cover required to meet connecting utilities;
1. Water Lines: 3.5 feet (or deeper if required by the AHJ); except that branch piping to fixtures within the building footprint shall have a minimum of 1 foot of cover.
2. Other: As required to meet connecting utilities; but minimum 1 foot of cover (unless indicated otherwise).

3.4 BEDDING

A. Pipe Bedding: Provide even bedding placement along the entire length of the pipe to support pipe on a uniformly dense unyielding foundation, without load concentration at joint collars or bells. Bedding shall be installed and compacted prior to installing pipe. Bedding located beneath piping shall have minimum thickness specified in Part 2 of specifications, and be compacted to 90% maximum density. Recesses shall be excavated as necessary at each joint or coupling to eliminate point bearing and to allow uniform pipe support by the bedding material the entire pipe length. Haunching shall be installed in maximum 4 inch lifts, hand placed and carefully worked under the pipe haunches and then compacted to 90% maximum density. All adjustment to line and grade shall be made by scraping away or filling in with bedding material under the body of the pipe and not by blocking or wedging. Bedding disturbed by pipe movement, or by removal of shoring movement of a trench shield or box, shall be reconsolidated prior to backfill.

B. Other Utility Bedding: Provide even bedding to allow for full support of the installed item on a uniform dense unyielding foundation. Bedding shall be installed and compacted before installing ducts or underground mechanical structures. Bedding shall have minimum of thickness specified in Part 2 of specifications, and be compacted to 95% maximum density.

3.5 BACKFILLING

A. General: Provide backfill of all trenches and underground mechanical structures to grade. Provide adequate initial backfill to allow proper pressure tests, and inspections by AHJ and Architect/Engineer. Leave joints and couplings uncovered as necessary to discover pipe leaks. Do not conceal underground utilities until AHJ and Architect/Engineer have reviewed utilities.

B. Utility Zone Backfilling: Backfill shall be placed in loose layers and compacted to 90 percent maximum density. Backfill shall be placed in horizontal layers no more than 6-inches thick. Backfill shall be brought up simultaneously on each side of the utility to the top of the utility, and onto the specified height above the utility (see Part 2 of specifications). Backfill and compact in a manner to avoid damaging or disturbing the completed utility.

C. Pipe Trench Backfilling: Backfill above the pipe zone backfill shall be accomplished in such a manner that the pipe will not be shifted out of position nor damaged by impact or overloading.

Where pipe is outside the building footprint, backfill shall be placed in horizontal layers no more than 6 inches thick and compacted to 95 percent maximum density. Where pipe is inside the building footprint, backfill shall be placed in horizontal layers no more than 6 inches thick and be compacted to 85 percent maximum density.

D. Duct Trench Backfilling: Backfill shall be accomplished in such a manner that the duct will not be shifted out of position nor damaged by impact or overloading. Backfill shall be placed in horizontal layers no more than 6 inches thick and be compacted to 96 percent maximum density.

E. Underground Mechanical Structure: After structure has been installed (or the concrete has been allowed to cure for the filled constructed items), backfill shall be placed in such a manner that the structure will not be damaged by the shock of falling backfill. The backfill shall be placed in such a manner as to prevent eccentric loading and excessive stress on the structure. Backfill shall be placed in horizontal layers no more than 12 inches thick, and be compacted to 95% maximum density.

F. Other Utility Backfill: Backfill shall be accomplished in such a manner that the utility will not be shifted out of position nor damaged by impact or overloading. Backfill shall be placed in horizontal layers no more than 6 inches thick and be compacted to 95 percent maximum density.

END OF SECTION

SECTION 200593 – TESTING, ADJUSTING, BALANCING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.

B. Requirements of Section 20 05 00 apply to this Section.

1.2 WORK INCLUDED

A. Air Balancing.

B. Report.

1.3 SUBMITTALS

A. General: Comply with Section 20 05 00.

B. Company: Submit name of Company proposed to do the balancing and sample balancing forms. Where the Company has not been pre-qualified, and substitutions are allowed after bidding (see Division 00 and 01), submit information regarding firm qualifications.

C. Personnel: Submit list of personnel that will be assigned to the project and their qualifications, and list of past projects.

D. Reports: Preliminary and final balancing reports.

1.4 REFERENCES

A. AABC-NS: Associated Air Balance Council, National Standards for Field Measurements and Instrumentation.

B. ASHRAE: Handbook of Fundamentals.

C. ACGIH-IV: American Conference of Governmental Industrial Hygienists, Industrial Ventilation, A Manual of Recommended Practice.

D. NEEB-PS: National Environmental Balancing Bureau Procedural Standard for Testing, Adjusting and Balancing Environmental Systems.

1.5 GENERAL REQUIREMENTS

A. General: Balancing shall be done by a company which specializes in this type of work and is totally independent and separate from the Company which has installed the systems to be balanced.

B. Balancers Qualifications:

C. General: Work of this Section shall be performed by balancing firms meeting the following and having prior approval from the Engineer:

1. Professional Affiliation: Firm shall be an Associated Air Balance Council (AABC) member balancer or National Environmental Balancing Bureau (NEBB) certified balancer.

2. Experience: Firm shall have satisfactorily completed the balancing work for at least 5 similar projects in the last 3 years. Similar is defined to mean: within 10% of the same quantity of units and air inlets/outlets, involve same type of systems, be the same type of facility (i.e. school, hospital, etc.). The lead field balancer (i.e. the individual who will be on site directing and participating in the balancing efforts) shall have at least 5 years of experience performing balancing work on similar projects.

3. References: Have five references for similar projects which have been completed in the last three years that will give a good or better performance rating. References shall be engineers, architects, or building owners. As part of the qualification process at least three of these references will be contacted and a rating obtained for the following: timeliness of work (i.e. able to complete work on schedule), cooperative nature of balancer's staff (i.e. ability to work well as a team with other project trades and professionals), overall quality of balancing work, quality of balancing report. Each item will be rated on a scale of 1 to 5 (5 being excellent), with the result averaged, score must be of 4 or better.

D. Pre-Qualified Balancers: As a convenience to the Contractor, the following balancing firms have been pre-qualified. This is not in any way intended to limit competition or prevent other firms from submitting qualifications, but is intended as an aid to Contractors by identifying firms that have been confirmed as meeting the qualification requirements.

1. Neudorfer Engineers

2. Hardin and Sons

E. Qualification Process: Firms not pre-qualified who desire to perform the balancing work shall submit a substitution request form in accordance with Contract Document requirements (reference Division 00 and 01). In addition to the information required on the substitution request form, submit: Company information, resumes of staff to be assigned, lists of projects, and references (with name of project, staff assigned to project, and contact name and phone number).

F. Balancing Issues: Notify the Engineer in writing of all problems or discrepancies between actual conditions and what design documents show as work proceeds.

G. Engineer's Authority: The Balancer shall be directly responsible to the Engineer and shall perform this work and make system adjustments as directed by the Engineer.

H. Lead Balancer: The Balancer shall assign an individual as "lead balancer" to work in the field to directly supervise the balancing work and field technicians. This lead field balancer shall have at least 5 years of experience performing balancing work on similar projects.

PART 2 - PRODUCTS

2.1 GENERAL INSTRUMENTATION

A. General: Balancing equipment shall comply with Associated Air Balance Council recommendations for field measurement instrumentation.

B. Calibration: All measuring instruments shall be accurately calibrated and maintained in good working order. Calibration dates and certifications shall be available at Engineer's request.

C. Instruments: Shall be capable of:

D. Air velocity instruments, direct reading in feet per minute with 2% accuracy.

E. Static pressure instruments, direct reading in inches water gauge with 2% accuracy.

F. Tachometers, direct reading in revolutions per minute with 1/2% accuracy; or revolution counter accurate with 2 counts per 1,000.

G. Thermometers, direct reading in degrees Fahrenheit with 1/10 of a degree accuracy.

H. Pressure gauges, direct reading in feet of water or psig with 1/2% accuracy.

I. Water flow instruments, direct reading in feet of water or psig with 1/2% accuracy suitable for readout of balancing valve provided.

PART 3 - EXECUTION

3.1 GENERAL

A. Workmanship: All measurements and adjustments shall be in accordance with AABC-NS, NEEB-PS, and ACGIH-IV and recognized best balancing procedures. Measurements and adjustments of equipment shall be executed in a manner consistent with the manufacturer's recommendations.

B. Flow Rates:

1. General: All air and water systems shall be completely balanced and adjusted to provide the flow rates indicated (within tolerances indicated in this specification Section), and to produce an even heating and cooling effect and control response.

2. Balancer Determined: Where flow rates have not been indicated the balancer shall determine such flow rates using acceptable practices in accordance with AABC-NS, NEEB-PS, and ASHRAE standards and submit the proposed flow rates to the Engineer for review.

3. Confirmation: Prior to beginning balancing confirm any flow rate changes since design with the submittals and flow rates indicated therein, and with the Engineer to confirm changes made since design. Assume that new flow rates will be issued.

C. Controls: Consult and coordinate with the Control Contractor for the adjustment and setting of all control devices to allow for the balancing work, and for proper system operation and proper flow rates. Set all controls and valves as required to maintain design flow rates and temperatures as shown on the drawings. Make measurements and provide data to the Control Contractor to allow for proper control of items.

D. Comfort Adjustments: Make final adjustments for flow rates in order to optimize each space's comfort, including such considerations as temperature, drafts, noise, pressurization, and air changes. Where variances are made from design values, state reasons in report (e.g., "too noisy", "too drafty," etc.). All such variances are subject to approval by the Architect/Engineer.

E. Deficiency Reports: Submit deficiency reports where the work does not allow balancing to occur or balancing issues develop. Indicate date, system and equipment involved, location, description of deficiency, and related information to allow for diagnosing the problem. Provide suggestions for resolution where possible.

3.2 AIR BALANCING

A. Pre-check of System: Prior to beginning balancing, perform, as a minimum, the following:

1. Verify that clean filters have been installed, that system is free from debris, and that all inlets/outlets are not obstructed.

2. Check all fans and equipment to verify that proper start-up and system preparation has been done by the installing contractor.

3. Check all door/window and similar building opening status to insure building is ready and proper pressurization can be obtained.

4. Open all dampers to full flow position, check positions and operation of all motorized dampers to allow full system flows.

5. Review controls and sequences of operation.

B. Tolerances: All air flow rates (supply, return, and exhaust) shall be adjusted to within plus 5 percent and minus 5 percent of the values shown in the contract documents, except that relative space-to-space pressure relationships shall always be maintained (e.g., restrooms shall be negative relative to other areas, general offices shall be positive, etc.).

C. Draft and Noise Adjustments: All diffusers, grilles, and registers shall be adjusted to minimize drafts and to eliminate objectionable noise.

D. Filters: Air balancing shall be done with new, clean air filters installed. Adjust air deliveries so that design quantities will be obtained when filters are half dirty. This condition shall be simulated by covering a portion of the filter area.

E. Fan Speeds: Adjust fan speeds as required to produce design flow rates.

F. Marking: Upon completion of flow readings and adjustments permanently mark the balanced position of all balancing valves by stamping the indicator plate of the valve.

G. Duct Traverse: Rectangular duct traverses shall measure the center of equal areas in the air flow stream, with centers not more than 6 inches apart. Round duct traverses shall measure at least 20 locations, with locations being the centers of equal annular area. Reference ACGIH Industrial Ventilation Manual.

H. One Open Run: Balance each branch run so that there is at least one wide open run; balance branches relative to one another so that at least one branch damper is wide open (except that where unique conditions exist, and the Engineer gives prior approval, one open damper on runs or branches is not required).

I. Data: Data to be measured/recorded and provided in report for all air handling systems and equipment:

1. Floor plans clearly showing and identifying all diffusers, grilles, OA louvers, ducts and all other items where air flow rates were measured.

2. Identify manufacturer, model number, size, and type of all air inlets/outlets.

3. Initial, trial, and final air flow measurements for all diffusers, grilles, OA louvers, ducts, and all other items where air flow rates were measured.

4. Design air flow rates and percentage final air flow rates are of design values.

5. Final damper (or other balance device) final position (as a percentage of full open).

6. The connected voltage and corresponding nameplate full load amps, and the initial and final amperages of all fan motors.

7. Initial and final RPMs of all fans.

8. Static pressures on inlet and outlet of all fans.

9. Fan initial and final CFMs.

10. Outdoor air CFMs (record minimum and maximum values).

11. Entering and leaving air temperatures across coils with coils operating at 100% capacity.

12. Static pressure drop across each filter bank and coil.

13. Final position of any speed controls (as percent of full).

14. In addition to data noted elsewhere, provide the following for all equipment which are part of balanced systems:

    a. Equipment name and number (as used on drawings).

    b. Service.

    c. Equipment manufacturer and model number.

d. Sheave and belt sizes (where applicable).

e. Filters sizes and quantities (where applicable).

f. Motor manufacturer and complete nameplate data.

g. Design operating conditions.

h. Actual operating conditions (flows, pressure drops, rpm, etc.).

3.3 BALANCING REPORT

A. General: A balancing report shall be submitted as specified herein, documenting all balancing procedures and measurements.

B. Report Organization: The report shall be divided into logical sections consistent with the building or system layout (i.e. by floors, building wings, air handling units, or other convenient way). Tabulate data separately for each system. Describe balancing method used for each system.

C. Preliminary Report: Two preliminary review copies of the balancing report shall be submitted to the Architect/Engineer when the balancing work is 90% complete (or as near 90% complete as possible due to uncompleted work of other trades). In addition to containing all the information required of the final report, the preliminary report shall contain a list of all the work required of other trades in order to allow the balancing work to be completed. The Architect/Engineer will review the preliminary report and inform the Contractor of any additional items or revisions required for the final report. Preliminary reports may be omitted where the Architect/Engineer grants approval.

D. Final Report: Shall be included in the Operation and Maintenance Manual. Submit reports to Contractor for inclusion in Manuals (or, when manuals have been already sent to Engineer, send report to Engineer who will insert report into Manual). Provide number of reports as required to match quantity of O&M Manuals, but in no case less than five.

E. Format: 8-1/2" x 11" size, neat, clean copies, drawings accordion folded. Report shall be typed, shall have a title page, table of contents, and divider sheets with identification tabs between sections. Information shall be placed in a three hole notebook, with the front cover labeled with the name of the Job, Owner, Architect/Engineer, Balancing Contractor, and Report Date.

F. Electronic Copy: Provide copy of reports in *.pdf format; submit final report with closeout documents per Divisions 00 and 01.

G. General Balancing Information Required:

1. At the beginning of the report, include a summary of problems encountered, deviations from design, remaining problems, recommendations, and comments.

2. List of instruments used in making the measurements and instrument calibration data.

3. Names of personnel performing measurements.

4. Explanation of procedures used in making measurements and balancing each system.

5. List of all correction factors used for all diffusers, grilles, valves, venturi meters, and any other correction factors used.

6. Areas where difficulties were encountered in obtaining design flow rates, or where unstable operating conditions may exist.

7. Note any parts of the system where objectionable drafts or noises may be present and efforts made to eliminate same and why they may still be present.

8. Note where variances from design values occur; explain why.

9. All specified measurements, balancing data, any additional recorded data, and observations.

END OF SECTION

SECTION 200700 – MECHANICAL INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.

B. Requirements of Section 20 05 00 apply to this Section.

1.2 WORK INCLUDED

A. Duct Insulation.

B. Pipe Insulation.

C. Equipment and Specialties Insulation.

1.3 DEFINITIONS

A. R: Thermal resistance of insulation, in units of hr-sf-deg F/Btu.

B. Subject to Damage: Items installed exposed less than 8 feet above the walking surface (i.e. floor, platform, roof, grade, etc.) adjacent to the item.

C. Cold Surfaces: Surfaces that will have operating temperatures below the temperature of the surrounding air by at least 5 deg F or more; includes chilled water piping, cooling condensate piping, air conditioning ductwork, outdoor air ductwork, and similar systems. Surfaces shall be considered a cold surface unless specifically indicated otherwise.

1.4 QUALITY ASSURANCE

A. All insulation and materials shall have a fire hazard rating not to exceed 25 for flame spread and 50 for smoke development, as tested by ASTM E 84, NFPA 255, and UL 723.

1.5 SUBMITTALS

A. General: Comply with Section 20 05 00.

B. Product Data: Provide product data on all insulation materials to be used. Indicate thicknesses to be used.

1.6 GENERAL REQUIREMENTS

A. Code Compliance: Contractor shall insulate all systems with the materials and thicknesses as required by code, but in no case shall the insulation be less than that specified herein. In some cases the specified insulation exceeds code, and shall be provided as specified. Not all systems requiring insulation by code are specified, but shall be provided with insulation where required by code.

B. Insulation at Hangers: Insulation shall be continuous through hangers on all insulated systems (except ductwork). Inserts at hangers are specified in Section 20 05 29 and are considered as part of the hanger and support system. Inserts are required to be installed at the time of pipe installation and are intended to be installed by the Contractor installing the pipe hangers/supports. See Section 20 05 29.

1.7 REFERENCES

A. ASTM A 653: Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot Dip Process.

B. ASTM B 209: Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

C. ASTM C 411: Standard Test method for Hot-Surface Performance of High Temperature Thermal Insulation.

D. ASTM C 534: Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation.

E. ASTM C 547: Standard Specification for Mineral Fiber Pipe Insulation.

F. ASTM C 1136: Standard Specifications for Flexible, Low Permeance Vapor Retarders for Thermal Insulation.

G. ASTM C 1290: Standard Specification For Flexible Fibrous Glass Blanket Insulation Used to Externally Insulate HVAC Ducts.

H. ASTM E 84: Standard Test Method for Surface Burning Characteristics of Building Materials.

I. NCIIS: National Commercial & Industrial Insulation Standards, published by Midwest Insulation Contractors Association, 5th Edition.

J. NFPA 255: Standard Method of Test of Surface Burning Characteristics of Building Materials.

K. UL 723: Tests for Surface Burning of Building Materials.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Products shall comply with Section 20 05 00, Paragraph Part 2.1, Acceptable Manufacturers.

B. Insulation: Johns Manville, Armacell, Owens-Corning, Knauf, Rubatex, Aeroflex, Pittsburgh Corning, GLT, Halstead, Gilsulate, Manson.

C. Accessories: Johns Manville, Armacell, Owens-Corning, Knauf, Rubatex, Aeroflex, Pittsburgh Corning, GLT, Halstead, Duro Dyne, Gustin Bacon, Childers, RPR, Tee Cee, Lewco Specialty Products, JPS, Buckaroos, Manson.

2.2 DUCT INSULATION

A. Flexible Glass Fiber:
1. Type: Flexible blanket type, constructed of inorganic glass fibers bonded by a thermosetting resin, complying with ASTM C 1290, Type III. Johns Manville "Microlite" (or approved).
2. Jacket: FSK type, vapor proof, consisting of an aluminum foil cover reinforced with glass fiber mesh, and laminated to kraft. Water vapor permeance shall not exceed 0.05 perms. Provide with joint sealing tape, minimum 2 inches wide, constructed of jacket material with adhesive to seal all joints.
3. Thermal Conductivity: Shall not exceed 0.27 Btu-in/hr-sq ft-deg F at 75 deg F.
4. Operating Limits: 40 degrees F to 250 deg F.

B. Glass Fiber Mesh: Open weave glass fiber reinforcing mesh for use with insulation coatings to bridge gaps and add strength to the coating. Minimum 5 strands x 5 strands per square inch. Non-combustible Childers "Chil-Glas" (or approved equal).

C. Duct Insulation - Aboveground-Inside Buildings: Flexible glass fiber.

D. Duct Insulation Thickness:
1. General: Provide insulation densities and thicknesses to achieve the R values cited below. R values are for the insulation only, in their installed thickness, considering installed duct wrap stretch and in accordance with code.
2. Lining: Where ducts have internal lining, the insulating properties of the lining may be credited toward meeting the required insulation R value; use R-3.65 per inch of installed liner.
3. Supply Air Ductwork:
   a. Inside Building and Within Building's Thermal Envelope: R-3.3 (except where ran exposed in conditioned spaces, no insulation is required).
   b. Inside Building But Not Within Building's Thermal Envelope: R-7.3.
4. Return Air Ductwork:
   a. Inside Building and Within Building's Thermal Envelope: No insulation required; except where duct contains air that may vary by 10 deg F or more from the space the duct passes through, R-3.3 insulation shall be provided.
   b. Inside Building But Not Within Building's Thermal Envelope: R-7.3.
5. Outside Air Ductwork: Shall be insulated same as required for the building envelope; except where allowed by code to be insulated less than the building envelope, shall be R-8; insulation is not required where duct run outside the building.
6. Exhaust, Relief, and Special Ductwork:
   a. Inside Building and Within Building's Thermal Envelope:
      1) Temperature of Air in Duct within 10 Deg F of Temperature of Air in Spaces Duct Passes Through: No insulation required except ductwork from the

system's backdraft damper (or motorized damper) to outside the building shall be insulated same as required for the building envelope.

2) Temperature of Air in Duct more than 10 Deg F Different from temperature of Air in Spaces Duct Passes Through: R-8.3; except ductwork from the system's backdraft damper (or motorized damper) to outside the building shall be insulated same as required for the building envelope (but no less than R-8.3).

b. Inside Building But Not Within Building's Thermal Envelope: R-8.3.

2.3 PIPE INSULATION

A. Glass Fiber:
1. Type: Rigid molded type, constructed of glass fibers bonded by a thermosetting resin, complying with ASTM C 547 Type I. Insulation factory molded to match pipe size applied to. Johns Manville "Micro-Lok" (or approved).
2. Jacket: ASJ type, vapor proof, consisting of a white kraft paper cover reinforced with glass fiber and bonded to aluminum foil, with longitudinal self sealing closure system. Provide with butt strips constructed of jacket material with adhesive to seal all joints. Water vapor permeance shall not exceed 0.02 perms.
3. Thermal Conductivity: Shall not exceed 0.24 Btu-in/ hr-sq ft-deg F at 75 deg F.
4. Operating Temperatures: 0 deg F to 850 deg F.

B. Elastomeric Insulation:
1. Type: Flexible cellular elastomeric insulation, factory formed to match pipe sizes applied to, complying with ASTM C 534, Type 1. Armacell "AP/Armaflex SS" (or approved).
2. Thermal Conductivity: Shall not exceed 0.27 Btu-in/ hr-sq ft-deg F at 75 deg F.
3. Water Vapor Transmission: Water vapor permeance shall not exceed 0.08 perms.
4. Operating Temperatures: -200 deg F to 220 deg F; shall be able to withstand 250 deg F temperatures for 96 hours per ASTM C 411 without damage or deformation.

C. Pipe Fittings: Shall be covered using any one of the following methods of the Contractor's choice:
1. Prefabricated segments of pipe insulation of same materials and thickness as the adjoining pipe insulation, formed to match pipe fitting.
2. Pre-cut fiberglass insulation and pre-molded high impact, gloss white, UV resistant, minimum 20 mil thick, PVC covers suitable for the pipe size and insulation thickness application, PVC cover shall be Johns Manville "Zeston 2000 PVC" (or approved).
3. Insulating plastic cement brought up the full height of the adjacent covering.
4. Except, where colored PVC jacketing is applied to piping, fittings shall use PVC covers of the same thickness and color as the PVC jacketing specified for the piping.

D. Metal Jacket: Aluminum roll jacketing, factory formed to match pipe size and insulation application, with smooth surface, manufactured from 3003 or 5005 aluminum alloy, H-14 temper, conforming to ASTM B 209. Shall be minimum 0.020 inches thick, with an integrally bonded interior 1 mil thick heat bonded polyethylene moisture barrier over the entire surface in contact with the insulation. Fitting covers shall be fabricated of same material as pipe runs, factory formed to match fitting.

E. Pipe Insulation Types:
1. Aboveground-Inside Building:
a. Refrigerant Piping: Elastomeric.

b. Other Systems: Glass fiber.

2. Aboveground-Outside Building: Same as specified above, with metal jacket.
3. Metal and PVC Jacketing: See "Part 3 - Execution".

F. Pipe Insulation Thickness:

1. General: Provide minimum piping insulation thickness indicated, in inches.

INSULATION THICKNESS (INCHES)

	Nominal Pipe Diameter (Inches)				
Fluid Design Operating Range, deg F	≤1	1 to ≤1-1/2	1-1/2 to <4	4 to <8	≥8
Above 350	4.5	5.0	5.0	5.0	5.0
251 - 350	3.0	4.0	4.5	4.5	4.5
201 - 250	2.5	2.5	2.5	3.0	3.0
141 - 200	1.5	1.5	2.0	2.0	2.0
61 - 140	1.0	1.0	1.5	1.5	1.5
40 - 60	0.5	0.5	1.0	1.0	1.0
Below 40	0.5	1.0	1.0	1.0	1.5

2. Varying Temperatures: Where a system operates over temperature ranges calling for different insulation thicknesses, the thicker insulation requirements shall be met.
3. Condensate: Cooling system condensate piping (i.e. from a cooling coil) shall be considered to operate at 50 deg F.
4. Refrigerant Piping: Refrigerant piping (RG or RS piping) returning from an evaporator (i.e. cooling coil) to a compressor shall be considered to operate at 40 deg F. Refrigerant piping (RL piping) from a condenser to an evaporator does not require insulation (unless noted otherwise).
5. Outdoor Piping: Piping exposed to outside air or, located outside the building/thermal envelope, shall have insulation thickness increased by 0.5 inch from that indicated above.
6. Cold Water: Cold water piping shall be considered to operate at 56 deg F (unless noted otherwise).

2.4 EQUIPMENT AND SPECIALTIES INSULATION

A. P-traps and HW/CW Lines on ADA Compliant Sinks and Lavatories: Prefabricated insulation specially designed for p-trap application, with white elastomeric insulation, white high gloss pvc cover, and velcro closure. Provide section for insulating HW stop and CW stop and associated piping of same material. McGuire "Pro-Wrap" (or approved).

B. Flexible Glass Fiber:

1. Type: Flexible blanket insulation, constructed of inorganic glass fibers bonded by a thermosetting resin, complying with ASTM C 553, Type III. Johns Manville "812 Spin-Glas" (or approved).
2. Jacket: FSK type, vapor proof, consisting of an aluminum foil cover reinforced with glass fiber mesh, and laminated to kraft. Water vapor permeance shall not exceed 0.05 perms. Provide with joint sealing tape constructed of jacket material with adhesive to seal all joints.
3. Thermal Conductivity: Shall not exceed 0.24 Btu-in/ hr-sq ft-deg F at 75 deg F.
4. Operating Temperature Limits: 40 deg F to 450 deg F.

5. Density: 1.5 lb/cu ft.

C. Semi-Rigid Glass Fiber:
1. Type: Semi-rigid board insulation, constructed of inorganic glass fibers bonded by a thermosetting resin.
2. Jacket: ASJ type, vapor proof, consisting of a white kraft paper cover reinforced with glass fiber and bonded to aluminum foil, with longitudinal self sealing closure system. Provide with butt strips constructed of jacket material with adhesive to seal all joints. Water vapor permeance shall not exceed 0.02 perms.
3. Thermal Conductivity: Shall not exceed 0.29 Btu-in/hr-sq ft-deg F at 75 deg F.
4. Operating Temperature Limits: 0 deg F to 650 deg F.

D. Elastomeric:
1. Type: Flexible cellular elastomeric insulation, complying with ASTM C 534, Type II.
2. Thermal Conductivity: Shall not exceed 0.30 Btu-in/ hr-sq ft-deg F at 75 deg F.
3. Water Vapor Transmission: Water vapor permeance shall not exceed 0.08 perms.
4. Operating Temperatures: -200 deg F to 220 deg F; shall be able to withstand 250 deg F temperatures for 96 hours per ASTM C 411 with damage or deformation.
5. Weather Protection: Where installed outdoors provide with metal jacketing to protect from UV and weather exposure.

E. Corner Angles: 0.016 inch thick aluminum, alloy 3003 or 5005, with factory applied Kraft backing, complying with ASTM B 209.

F. Metal Jacket:
1. Steel: Minimum 24 gauge galvanized steel complying with ASTM A 653. Provide with longitudinal slip joints and 2-inch laps.
2. Aluminum: Minimum 0.020-inch thick aluminum, alloy 3003 or 5005, complying with ASTM B 209. Provide with longitudinal slip joints and 2-inch laps.

G. Equipment and Specialties Insulation Types and Thickness:
1. Unless a specific type of insulation is specified or noted, any of the insulation materials specified in this specification section may be used provided such application is in conformance with NCIIS.
2. Insulation Thickness: Insulation thickness shall be the same as that specified for the piping or ductwork connected to the item, or as specified for the system the item is installed in (unless noted otherwise). Insulation thickness shall in no case be less than 1 inch thick.
3. Valves: 2 Inches and Smaller: Insulate with same material as piping system.

2.5 ACCESSORIES

A. Adhesive, Caulks, Mastics, and Coatings: As recommended by insulation material manufacturer and suited for the application.

B. Bands: 1/2-inch wide, of stainless steel, galvanized steel, or aluminum construction, to match with materials used with.

C. Weld-Attached Anchor Pins and Washers: Copper-coated steel pin for capacitor-discharge welding and galvanized speed washer. Pin length shall be as required for insulation thickness

used with. Welded pin holding capacity 100 lb, for direct pull perpendicular to the attached surface. Style and type to suit application.

D. Adhesive-Attached Anchor Pins and Speed Washers: Galvanized steel plate, pin, and washer manufactured for attachment to duct and plenum with adhesive. Pin length sufficient for insulation thickness used with. Adhesive as recommended by the anchor pin manufacturer as appropriate for surface temperatures and materials used with, and to achieve a holding capacity of 100 lb for direct pull perpendicular to the adhered surface. Style and type to suit application.

E. Breeching Insulation: One layer of 2-inch thick high temperature (rated for 1000 deg. F) flexible glass fiber insulation, with an exterior wrap of 1-inch thick flexible glass fiber insulation.

PART 3 - EXECUTION

3.1 GENERAL

A. Pre-Insulation Review: No covering materials shall be applied until systems to be covered have had all tests satisfactorily completed, have had all required inspections, and have been satisfactorily reviewed by the Architect-Engineer. All systems shall be examined by the Contractor to confirm cleanliness and other conditions are appropriate to allow for insulation installation.

B. Insulation Work Review: No insulated items shall be concealed in the building structure or buried until the insulation work has been satisfactorily reviewed by the Architect-Engineer, and has had all required inspections.

C. Standards: Materials shall be installed in accordance with manufacturer's written instructions, NCIIS, and shall comply with materials and methods specified herein. The more stringent requirements govern.

D. Joints/Seams: Joints shall be staggered on multi layer insulation. Locate seams and joints in least visible location.

E. Insulation Protection: Insulation shall be kept clean and dry and shall be protected from dirt, damage, and moisture. Insulation that becomes dirty, damaged, or wet and cannot be restored to like new condition will be rejected, and shall immediately be removed from the jobsite.

F. Insulation Interruptions: Insulation shall be neatly finished at all supports, protrusions and interruptions. Provide adhesive and tape seal to maintain vapor barrier integrity.

G. Equipment and Floor Protection: Cover existing equipment and finished floors to protect such items from insulation fiber and dust. Keep all such existing areas in a "broom clean" condition at the end of each day. Take precautions in these areas to prevent glass fiber and insulation dust from entering ventilation systems or areas adjacent to the work.

H. Glass Fiber Insulation - General:
1. Finish all insulation ends with joint sealing tape or vapor barrier mastic, no raw edges allowed.

2. Joints: Tightly butt adjacent insulation sections together without any voids. Provide overlap of jacket material over all joints.

I. Items To Be Insulated: Provide insulation on all ductwork, all piping, all items installed in these duct and piping systems, all air and liquid energy conveying systems and components, all air and liquid energy storage, all equipment, and all energy consuming devices, except where such insulation has been specifically excluded.

J. Items Excluded From Being Insulated:
1. Sanitary sewer drain lines (except traps at handicap accessible fixtures).
2. Stops and risers at plumbing fixtures (except at handicap accessible fixtures).
3. Factory insulated water heaters (except for base on electric water heaters).
4. Factory insulated or factory lined HVAC, AHU, and AC units.
5. Hose bibbs (except where used as drains hot water systems).
6. Water meter.
7. Underground cold water piping and associated underground items.

3.2 DUCT INSULATION INSTALLATION

A. Types and Thickness: Insulate all ducts with insulation type and thickness (to provide the required R value) as specified in “Part 2 - Products”.

B. General: Insulation shall be firmly butted at all joints. All longitudinal seams for flexible insulation shall overlap a minimum of 2 inches. All joints and seams shall be finished with appropriate joint sealing tape. Installation shall provide a continuous sealed vapor barrier over all surfaces; seal all jacket penetrations with vapor barrier mastic or vapor barrier jacket tape.

C. Attachment: For rectangular ducts over 24 inches wide, duct insulation shall be additionally secured to the bottom of the ductwork with mechanical fasteners on 18 inch centers to reduce sagging. Washers shall be applied without compressing the insulation. Protruding ends or fasteners shall be cut off flush after washers are installed. All seams, joints, penetrations, and damage to the facing shall be sealed with joint sealing tape or vapor retardant mastic or appropriate joint sealing tape.

3.3 PIPE INSULATION INSTALLATION

A. Types and Thickness: Insulate all piping with insulation type and thickness as specified in “Part 2 - Products”. All piping shall be insulated except where specifically excluded.

B. General: All ends shall be firmly butted together and secured with joint sealing tape. All jacket laps and joint sealing tape shall be secured with outward clinch staples at 4 inch spacing, or by use of a suitable adhesive. Installation shall provide a continuous sealed vapor barrier over all surfaces; seal all jacket penetrations with vapor barrier mastic or vapor barrier jacket tape.

C. Elastomeric Pipe Insulation: Install with seams and joints sealed with rubberized contact adhesive. Insulation with pre-applied adhesive is not permitted. A brush coating of adhesive shall be applied to both butt ends to be joined and to both split surfaces to be sealed. Adhesive shall be allowed to set until dry to touch but tacky under slight pressure before joining the surfaces. Insulation seals at seams and joints shall not be capable of being pulled apart one hour

after application. Provide added tape wrap around insulation to ensure seam and joint closure. Insulation that can be pulled apart one hour (or more) after adhesive installation shall be replaced. Provide metal jacketing over outdoor exposed insulation.

D. Pipe Hangers: Provide insulation tight up to pre-insulated pipe supports at pipe hangers, seal all joints with joint sealing tape. Pre-insulated pipe supports are specified in Section 20 05 29.

E. Pipe Sleeves: Run insulation continuous full size through sleeve. Coordinate work with fire seals and confirm fire seal system is approved for use with insulated pipes; see Section 20 05 30.

F. Metal Jacketing: Provide metal jacket over piping insulation for all outdoor exposed piping.

3.4 EQUIPMENT AND SPECIALTIES INSTALLATION

A. Types and Thickness: All equipment and items installed in insulated duct and piping systems shall be insulated except where specifically noted not to be; reference paragraph 3.1. Insulation type and thickness shall be as specified in “Part 2 - Products”.

B. General: Apply insulation as close as possible to equipment by grooving, scoring, and beveling as necessary. As required, secure insulation to equipment with studs, pins, clips, adhesive, wires or bands. Fill joints, cracks, seams, and depressions with bedding compound to form smooth surface. Comply with NCIIS.

C. Removable: All equipment and specialties where access is required for maintenance, repair, service, or cleaning shall have insulation installed so that it can be easily removed and reinstalled without being damaged and without requiring new insulation. Removable insulation shall completely cover the item being insulated with an overlap over adjacent insulation to cover all joints. Insulation on cold surfaces shall provide a sealed vapor barrier so that no surfaces are exposed to ambient air and so that no condensation can occur; overlap enclosure ends minimum 2-inches.

D. ADA Compliant Lavatories and Sinks: Insulate P-trap and HW/CW supplies below lavatory and sink where exposed.

E. Nameplates: Do not insulate over nameplates or ASME stamps; bevel and seal insulation around.

F. Jacketing: Provide all equipment insulation with vapor retardant jackets.

END OF SECTION

SECTION 22 11 00 – FACILITY WATER DISTRIBUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.

B. Requirements of Section 20 05 00 apply to this Section.

1.2 WORK INCLUDED

A. Domestic Water Piping.

B. Valves.

C. Trap Primers.

D. Electric Heat Trace.

E. Water Service Connections.

F. Testing and Inspection.

G. Flushing and Disinfection.

1.3 DEFINITIONS

A. "Lead-Free" means not containing more than 0.2% lead in solder and flux; and not more than a weighted average of 0.25% lead in wetted surfaces of pipes, pipe and plumbing fittings and fixtures.

1.4 SUBMITTALS

A. General: Submittals shall comply with Section 20 05 00.

B. Product Data: Submit manufacturer’s product information on all items to be used.

C. System Tests and Inspections: Submit documentation showing systems have satisfactorily passed all pressure tests and code inspections.

D. Cleaning and Disinfection: Submit documentation regarding completion of flushing, disinfection, bacteriological tests, and Health Department’s acceptance of tests and system.

1.5 GENERAL REQUIREMENTS

A. ANSI/NSF Compliance: All items in contact with potable water shall be lead free in accordance with ANSI/NSF 61. Plastic piping system components shall comply with ANSI/NSF 14. Only lead-free solder shall be used.

B. Valves: Shall be dezincification resistant, and shall not contain more than 15% zinc in their chemical composition.

1.6 REFERENCES

A. ASME B16.3: Malleable Iron Threaded Fittings.

B. ASME B16.15: Cast Bronze Threaded Fittings: Classes 125 and 250.

C. ASME B16.18: Cast Copper Alloy Solder Joint Pressure Fittings.

D. ASME B16.22: Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.

E. ASME B16.24: Cast Copper Alloy Pipe Flanges and Flanged Fittings: Classes 150, 300, 400, 600, 900, 1500, and 2500.

F. ASTM E84: Standard Test Method for Surface Burning Characteristics of Building Materials.

G. ASTM A 778: Welded, Un-annealed Austenitic Stainless Steel Tubular Products.

H. ASTM B16.18: Seamless Copper Water Tube.

I. ASTM B32: Solder Metal.

J. AWS A5.8: Filler Metals for Brazing and Braze Welding.

K. AWWA B300: Hypochlorites.

L. AWWA B301: Liquid Chlorine.

M. AWWA M20: Water Chlorination and Chlorination Practices and Principles, 2nd edition.

N. ANSI/NSF Standard 61 Drinking Water System Components – Health Effects.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Products shall comply with Section 20 05 00, 2.1, Acceptable Manufacturers.

B. Pipe and Fittings: Domestic Manufacturers only.

C. Valves: Conbraco/Apollo, Nibco, Stockham, Walworth, Milwaukee, Kitz, Red-White, Watts, Hammond, ThermOmega Tech.

D. Pressure Reducing Valves: Conbraco/Apollo, Watts, Cla-Val, Bell & Gossett, Zurn/Wilkins.

E. Thermostatic Mixing Valves: MCC Powers, Leonard, Symmons, Lawler.

F. Additional manufacturers are as listed for each individual item.

2.2 PIPE AND FITTINGS - MATERIALS

A. Fittings:
1. Solder-Joint: Wrought copper and bronze fittings per ASME B 16.22 and cast copper alloy fittings per ASME B16.18, cast bronze threaded fittings per ASME B16.15.
2. Flanged: Cast bronze fittings per ASME B16.24.
3. Solder Material: 95/5 tin-antimony solder per ASTM B32 or “Silvabrite 100" (95.5 tin/4 copper/0.5 silver) solder; lead free.
4. Brazing Material: AWS A5.8, BCuP-5.

2.3 PIPE AND FITTINGS - APPLICATIONS

A. Domestic Water Piping - Above Ground: Type L or K copper with flanged, soldered joints or stainless steel; except where run exposed in finished areas shall be stainless steel, or be chrome plated copper, or be copper piping with a chrome plated sleeve.

B. Domestic Water Piping - Below Ground: Type K copper tubing with silver brazed joints; except that piping within the building footprint serving individual fixtures may be type L (soft or hard temper) copper

C. Trap Primer Piping: Type L or K "soft" or "hard" (bending temper) copper, with compression fittings or soldered joints

2.4 VALVES

A. Ball Valves: 600 psi non-shock cold working pressure, 100 psi at 300 deg F, bronze body, full port, 2 piece construction, anti-blowout stem, reinforced PTFE seats, stainless steel or chrome plated brass or silicon bronze ball, lever handle, solder or threaded connections. Provide with extended lever handle where valve is installed in systems with insulation thickness greater than 0.5 inch. Nibco S-585-66-LF, T-585-66-LF, Nibco S-585-80-LF, T-585-80-LF (or approved).

B. Thermostatic Mixing Valves – At Individual Fixtures: Hot and cold water thermostatic mixing valve for serving 1 to 2 fixtures. Brass construction, with stainless steel internals, integral checks and locking nut to prevent unauthorized adjustment. Adjustable from 90 to 110 degrees F, with accuracy in accordance with ASSE 1016 and UPC. Valve shall have capacity of at least 2 gpm at 20 psi differential, and control down to 0.5 gpm.

2.5 ACCESSORIES

A. Trap Primer Valve - Pressure Drop Type: Activated by drop-in water pressure. Constructed of corrosion resistant brass with integral backflow preventor, vacuum breaker ports, distribution manifold to suit number of drains served, adjustable to line pressure for water delivery. Precision Plumbing Products Model P-1 and P-2 (or approved).

2.6 Electric Heat Trace

A. Type: Electric self-regulating heat tracing strip, specifically designed for freeze protection. Raychem "XL-TRACE" (or approved).

B. Contruction: Heater shall consist of a flat, flexible, low heat density electric heater strip of parallel circuit construction, with a radiation cross-linked inner core of self-regulating conductive polymer material. Core shall be insulated with a radiation cross-linked polyolefin jacket and a flexible metal over-shield. Heater bus wired shall be 16 AWG. Heater strip shall be capable of being cut to desired length in the field.

C. Operation: Heater shall be for operation with voltage as shown on plans (or available) and shall provide 5 watts/foot output (unless noted otherwise). The heater shall be self-regulating type and shall vary its output in proportion to varying localized temperatures along the pipe without reliance on thermostat controls.

D. Accessories:
1. Power Connection Kit and Thermostat: Shall include junction box, terminal connectors and accessories allowing connection of power wiring to heater. Thermostat shall sense ambient temperatures and allow heat trace operation when temperature falls below 40 deg F, and to be off with higher temperatures.
2. Tee/Splice/End Kits: Shall allow for connection of tee heater wiring, splicing connections and end seal termination of heater.
3. Labels: Provide label reading, "Electric Traced"; minimum one (1) per 50 feet of heater. Locate labels at power connection kit location, end terminations, and other in-between locations as appropriate.
4. Tape: Fiberglass tape for attaching heater to pipe.

PART 3 - EXECUTION

3.1 GENERAL

A. Workmanship:
1. Installation of all items shall comply with code, best professional practices, manufacturers written installation instructions, and to allow for proper functioning of items being connected to.
2. Install all piping parallel to the closest wall and in a neat, workmanlike manner. Horizontal exposed straight runs of piping shall not deviate from straight by more than 1/4-inch in ten feet. Vertical piping shall not deviate from plumb by more than 1/8-inch in ten feet.
3. Do not run any piping above electrical panels (and similar electrical equipment). Provide offsets around such panels as necessary.

B. Complete System: Provide all piping as indicated and as required to allow supply connections to each fixture and equipment item requiring water supply. Provide offsets as required to accommodate building construction and access requirements per Section 20 05 00. For multistory buildings include costs to offset vertical piping at each floor level since structural member locations will not be the same on each floor.

C. Coordination: Coordinate installation of items with all trades that are affected by the work to avoid conflicts.

D. Expansion and Contraction: Install piping to accommodate system expansion and contraction; provide necessary offsets, expansion devices, anchors, guides and related accessories. See Section 20 05 29.

E. Openings for Piping: Provide openings in building construction sized to accommodate required sleeve size. Where sleeves are not required provide openings sized as follows:
   1. Belowground Penetrations: Inside diameter of opening shall be at least 2-inch larger than the outside diameter of the pipe or pipe covering (for covered piping systems), and so as to allow free movement of piping.
   2. Aboveground Penetrations: Inside diameter of opening shall be at least 1-inch larger than the outside diameter of the pipe or pipe covering (for covered piping systems), and so as to allow free movement of piping.
   3. Large Movement: Provide larger sleeves where a larger space around pipe exterior is required by code, where specifically noted, where pipe movement will occur (i.e. expansion/contraction or seismic), at expansive soils, other unusual conditions are present, and where required to accommodate large piping movement.

3.2 PIPE AND FITTINGS

A. Concealed: All piping in finished areas shall be installed concealed unless specifically noted otherwise. Provide escutcheons where piping is allowed to be exposed and pipe passes through building elements (i.e. walls, floors, ceilings, etc.).

B. Non-Obstructing: Install piping at such heights and in such a manner so as not to obstruct any portion of windows doorways, passageways, or access to any items requiring routine service, maintenance, or inspection. Offset or reroute piping as required to clear any interferences which may occur.

C. Drawing Review: Consult all drawings for location of pipe spaces, ducts, electrical equipment, ceiling heights, door openings, window openings, and other details and report discrepancies or possible conflicts to Architect/Engineer before installing pipe.

D. Insulation: Allow sufficient clearances for installation of pipe insulation in thickness specified. If interferences occur, reroute piping to accommodate insulation.

E. Drainage: Slope all piping to low points to allow the system to be drained. Provide added drain valves where system cannot be drained through fixtures.

F. Preparation for Joining: Prior to the joining of any section of pipe to a pipe run, the section shall be thoroughly cleaned inside and out, the ends shall be reamed to remove any cutting burrs and piping prepared as recommended by piping and fitting manufacturer.

G. Threaded Connections: Cut piping carefully, ream, thread and work into place without springing. Use TFE tape or lead and graphite lubricant (on male threads only).

H. Soldered Connections: Polish contact surfaces of fittings and pipes with emery cloth before fluxing male and female surfaces of joints. Steel wool and sandpaper not permitted for polishing.

I. Unions: Install unions in pipe connections to valves, coils, and any other equipment where it may be necessary to disconnect the equipment or piping for repairs or maintenance; and as indicated. Where flanged connections occur at equipment additional unions are not required unless indicated otherwise.

J. Insulating Unions: Install dielectric insulating connectors between all connections of copper piping and steel piping of steel equipment. Where flanged connections occur use insulating type flanges.

3.3 VALVES

A. Type: Ball type only.

3.4 ACCESSORIES

A. Trap Primers: Provide trap primers to all vented floor drains, floor receptors, and where required by the code. Install with an isolation valve in the branch line to the trap primer valve.

B. Access Doors: Provide access doors to all valves, water hammer arrestors, trap primers, backflow preventers, and any other piping accessories which would otherwise be inaccessible. See Section 20 05 19 for access door specifications.

C. Heat Tracing: Install heat tracing as shown on drawings and in accordance with manufacturer's instructions and code. Label piping with self-sticking labels clearly reading “HEAT TRACED”.

3.5 TESTING AND INSPECTION

A. All piping shall be tested, inspected, and approved by the local authority having jurisdiction prior to being concealed or covered.

B. Testing shall be witnessed by the plumbing inspector and the Architect/Engineer (at his option). Notify Architect/Engineer minimum 72 hours prior to date of testing, and mutually agreed upon times arranged.

C. Piping shall be hydrostatically tested for a period of 2 hours (or as required by local authority having jurisdiction), during which time no drop in pressure or leakage shall occur.

D. Test pressure shall be not less than 150 percent of the maximum to which the pipe will ordinarily be subjected; but in no case less than 75 psig.

E. Any leaks or defective piping disclosed by testing and inspection shall be repaired with new materials and the system re-tested.

F. Provide documentation to the Engineer indicating that the system has been completely pressure tested, and all portions inspected and accepted by the local authority having jurisdiction.

3.6 FLUSHING AND DISINFECTION

A. System Flushing: After tests are completed, all water piping shall be flushed. In general, sufficient water shall be used to produce a minimum water velocity of 2.5 feet per second through piping being flushed. Flushing shall be continued until discharge water shows no discoloration. System shall be drained at low points. Strainer screens shall be removed, cleaned, and replaced in line. System valves and fixture faucets shall be opened and re-closed to completely flush system. After flushing and cleaning, systems shall be prepared for disinfection service by immediately filling water piping with clean, fresh potable water. Any stoppage, discoloration, or other damage to the finish, furnishings, or parts of the building during this process shall be repaired by the Contractor.

B. Disinfection:
   1. Upon completion of the job and prior to final acceptance, the plumbing system shall be disinfected with Chlorine solution. Review procedures and disinfection with the authority having jurisdiction to insure that all work complies with code requirements. Verify any deviations from specified procedures with the Architect/Engineer prior to proceeding. The chlorinating material shall be either liquid chlorine conforming to AWWA B301 or hypochlorite conforming to AWWA B300 (or as otherwise required by the authority having jurisdiction). Water chlorination procedure shall be in accordance with AWWA M20 (or procedure acceptable to AHJ and to the Architect/Engineer). The chlorinating material shall provide a dosage of not less than 50 parts per million and shall be introduced into the system in an approved manner. The treated water shall be retained in the pipe long enough to destroy all non-spore-forming bacteria.
   2. The retention time shall be at least 24 hours and shall produce not less than 10 ppm of chlorine at the extreme end of the system at the end of the retention period. All valves in the system being sterilized shall be opened and closed several times during the contact period. The system shall then be flushed with clean water until the residual chlorine is reduced to less than 1.0 ppm. During the flushing period all valves and faucets shall be opened and closed several times.

C. Bacteriological Tests: The Contractor shall employ an approved agency to take test samples at several points of the system (i.e. end of each wing, each floor of building, etc.) in properly sterilized containers and arrange with the Health Department (or a test agency acceptable to the Health Department) having jurisdiction to test the samples. Test for coliform and other items as required by the AHJ. Should the samples not test satisfactory, the system shall be re-flushed and disinfected again until satisfactory samples are obtained.

D. Submittal: Submit documentation stating that flushing and disinfection has been completed, copies of the bacteriological test results, and certification from the Health Department having jurisdiction stating that system has been found acceptable.

END OF SECTION

SECTION 221300 – FACILITY SANITARY SEWERAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.

B. Requirements of Section 20 05 00 apply to this Section.

1.2 WORK INCLUDED

A. Soil, Waste and Vent Piping.

B. Cleanouts.

C. Testing and Inspection.

D. Accessories.

1.3 SUBMITTALS

A. General: Submittals shall comply with Section 20 05 00.

B. Product Data: Submit product information on all items to be used.

1.4 REFERENCES

A. ASME B 16.4: Gray Iron Threaded Fittings.

B. ASME B 16.12: Cast Iron Threaded Drainage Fittings.

C. ASME B 16.15: Cast Bronze Threaded Fitting Classes 125 and 250.

D. ASME B 16.18: Cast Copper Alloy Solder Joint Pressure Fittings.

E. ASME B 16.22: Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.

F. ASME B 16.23: Cast Copper Alloy Solder Drainage Fittings.

G. ASME B 16.29: Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings (DWV).

H. ASTM A 53: Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

I. ASTM A 74: Cast Iron Soil Pipe and Fittings.

J. ASTM A 888: Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications.

K. ASTM B 32: Solder Metal.

L. ASTM B 88: Seamless Copper Water Tube.

M. ASTM B 306: Copper Drainage Tube (DWV).

N. ASTM C 564: Rubber Gaskets for Cast Iron Soil Pipe and Fittings.

O. ASTM C 1277: Shielded Couplings Joining Hubless Cast Iron Soil Pipe and Fittings.

P. ASTM D 2321: Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.

Q. ASTM D 2657: Heat Fusion Joining or Polyolefin Pipe and Fittings.

R. ASTM D 2843: Density of Smoke from the Burning or Decomposition of Plastics.

S. CISPI 301: Hubless Iron Soil Pipe and Fittings for Sanitary and Drain, Waste, and Vent Piping Applications.

T. CISPI 310: Coupling for Use in Connection with Hubless Cast Iron Soil Pipe and for Sanitary and Storm Drain, Waste, and Vent Piping Applications.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Products shall comply with Section 20 05 00, 2.1, Acceptable Manufacturers.

B. Pipe and Fittings: Domestic Manufacturers only

C. No Hub Couplings: ANACO, Mission Rubber, Tyler, MG Coupling, Fernco, Clamp-All, Mifab. Ideal-Tridon.

D. Cleanouts: Josam, Zurn, J.R. Smith, Wade.

2.2 PIPE AND FITTINGS - MATERIALS

A. No-Hub Cast Iron Pipe and Fittings:
1. Pipe and Fittings: Service weight no-hub cast iron pipe and cast iron fittings, per CISPI 301 and ASTM A 888, for use with mechanical no-hub couplings.
2. Couplings: Per CISPI 310 or ASTM C 1277, with a cast iron or stainless shield, and neoprene gasket per ASTM C 564.
3. Heavy Duty Couplings:

a. Heavy duty clamp type coupling, with stainless steel shield minimum 0.015-inch thick, stainless steel clamps, stainless steel screws minimum 0.375-inch nominal diameter, gasket per ASTM C 564, and minimum 4 clamps each coupling. ANACO Husky SD 4000.
b. Heavy duty cast iron constructed clamp, two piece, with stainless nuts/bolts, neoprene gasket per ASTM C 564. MG Piping Products "MG Coupling".

B. Hub and Spigot Cast Iron Pipe and Fittings: Service weight hub and spigot cast iron pipe and cast iron fittings per ASTM A 74, for use with compression gaskets. Gaskets shall conform to ASTM C 564.

C. Copper DWV Pipe and Fittings: Copper drainage tube per ASTM B 306. Wrought copper and wrought copper alloy solder joint fittings per ASME B 16.29; or cast copper alloy solder joint fittings per ASME B 16.23.

D. Galvanized Steel DWV Pipe and Fittings: Schedule 40 galvanized steel pipe per ASTM A 53, Grade B, Type 5. Cast iron drainage fittings, threaded, per ASME B 16.12; and cast iron screwed fittings per ASME B 16.4.

E. Copper Pipe and Fittings: Seamless copper water tube, tube L or M, per ASTM B 88. Solder joint wrought copper and bronze fittings per ASME B 16.22 cast copper alloy fittings per ASME B 16.18, and cast bronze threaded fittings per ASME B 16.15 with 95/5 tin-antimony solder per ASTM B 32.

2.3 CLEANOUTS

A. General:
1. All cleanouts shall have cast iron bodies with bronze countersunk rectangular slotted plugs, lubricated with a non-hardening teflon base thread lubricant and having a gasket seal.
2. Cleanouts located in waterproof membrane floors shall be provided with an integral cast flange and flashing device.
3. All cleanouts shall be the same size as the pipe which they are intended to serve (but not larger than 4-inch).
4. Pipe fittings for cleanouts which turn through walls or up through floors shall use long sweep ells or a "Y" and 1/8 bend.
5. All cleanouts and access covers shall be provided with vandal proof screws.

B. Floor Cleanouts: Zurn Z1400 (or equal) adjustable floor cleanout with round heavy duty stainless steep top.

C. Wall Cleanouts: Cast iron ferrule with cast bronze taper threaded plug, with plug tapped 1/4-inch, 20 thread, to accept access cover screw; with stainless steel access cover and vandal proof screw.

D. Outside Cleanouts: Heavy duty, round, cast iron, double-flanged housing, having scoriated cast iron cover with lifting device, ferrule and bronze closure plug. Housing and lid shall be galvanized and have vandal resistant screws. J.R. Smith No. 4251 or 4256 Series.

2.4 ACCESSORIES

A. Vent Flashing:
   1. General: Style and type to suit roofing system, match vent pipe size, and provide waterproof building penetration. Provide with adequate base size for proper flashing into roof system.
   2. EPDM or compression molded rubber; suitable for temperatures from -60 deg F to 270 deg F; resistant to ozone and UV light. Flashing shall have aluminum or galvanized steel base for flashing or attachment to roof (style to suit roof type). Provide stainless steel clamp.
   3. 2.5 lb sheet lead, extending as a sleeve all around vent pipe with base extended out minimum 10 inches all around; top counter-flashing overlap 2" and turned down inside vent pipe.

PART 3 - EXECUTION

3.1 GENERAL

A. Installation of all items shall comply with code, best professional practices, manufacturers written installation instructions, and to allow for proper functioning of items being connected to.

B. Provide all piping as indicated and as required to allow complete and proper waste, drain, and vent connections to each fixture and equipment item requiring connection. Provide offsets as required to accommodate building construction and access requirements per Section 20 05 00. For multistory buildings include costs to offset vertical piping through each floor level since structural member locations will not be the same on each floor.

C. Coordinate installation of items with all trades that are affected by the work to avoid conflicts.

D. The work of this section shall include all waste (sanitary sewer), drain, and vent lines inside of the building and 5-feet outside of the building (unless indicated otherwise), to the point of and including connections to outside sanitary sewer lines or sanitary sewer manholes.

E. Consult manufacturers data and architectural drawings for information on plumbing fixtures before beginning rough-in.

F. Verify points of connection, invert elevations, and grade requirements before beginning installation or ordering materials.

G. Stub all piping for all items requiring connections through wall or floor; cap and protect until connection to items is complete.

H. Vents extending through roof shall terminate at least 10 inches above roofing; and not less than 10 feet from and 3 feet above any building opening. Provide vent flashing at each vent through roof; utilize water-proof method as required to best suit roofing material and roofing system manufacturer.

I. Trap all fixtures and equipment items as required by governing code; provide proper venting for each trap.

J. Provide drain piping for all drip pans, unit condensate drains, unit P-traps, etc. Run piping to nearest point of drainage, or as shown on drawings. Where routing is not shown, route to nearest point of proper drainage.

K. Provide piping connections to equipment furnished by others in accordance with Section 20 05 00.

L. All excavation, trenching and backfilling shall comply with code and pipe manufacturers recommendations.

3.2 PIPE AND FITTINGS

A. All piping in finished areas shall be installed concealed unless specifically noted otherwise.

B. Install piping so as not to obstruct access to any items requiring routine service, maintenance, or inspection. Offset or reroute piping as required to clear any interferences which may occur. Prior to running any piping, confirm with Architect/Engineer (unless is clearly noted to be ran exposed). Install exposed piping so as not to obstruct any portion of windows, doors, doorways, passageways, or items requiring service or access.

C. Consult all drawings for location of pipe spaces, ducts, electrical equipment, structural elements, ceiling heights, door items requiring access, openings, window openings, and other details and report discrepancies or possible conflicts to Architect/Engineer before installing pipe.

D. Install all horizontal soil or waste lines with a slope of 1/4-inch per foot unless noted otherwise. Coordinate with AHJ if written approval is required for exceptions to 1/4-inch per foot slope.

E. Make all changes of direction and junctions with Y fittings and 1/8 bends; use sanitary tee fittings in vertical pipe only.

F. Provide escutcheons where exposed pipe passes through walls, floors, or ceilings.

G. Install all piping parallel to the closest wall and in a neat, workmanlike manner. Horizontal straight runs of piping shall not deviate from straight by more than 1/4-inch in ten feet. Vertical piping shall not deviate from plumb by more than 1/8-inch in ten feet.

H. Do not run any piping above electrical panels (and similar electrical equipment). Provide offsets around such panels as necessary. Such offsets are typically not shown on the plans, but are required per this paragraph.

I. Prior to the joining of any section of pipe to a pipe run, the section shall be thoroughly cleaned inside and out, the ends shall be reamed to remove any cutting burrs and piping prepared as recommended by piping and fitting manufacturer.

J. Threaded Connections: Cut piping carefully, ream, thread and work into place without springing. Use TFE tape or lead and graphite lubricant (on male threads only).

K. Soldered Connections: Polish contact surfaces of fittings and pipes with emery cloth before fluxing male and female surfaces of joints. Steel wool and sandpaper not permitted for polishing.

3.3 INSTALLATION OF CLEANOUTS

A. General: Install cleanouts in all soil and waste piping:
   1. As shown on drawings.
   2. At no more than 100 foot intervals on horizontal runs (whether shown on drawings or not).
   3. At the end of all piping runs.
   4. At the base of all vertical risers.
   5. At all changes of direction for a run of 10 feet or over.
   6. Where needed to correct possible stoppage.
   7. As required by Code.

B. Elevations:
   1. Floor cleanouts shall be installed so as to be flush with the finished floor; where recessed cleanout covers are used the recess shall be filled flush with material to match the surrounding finished floor.
   2. Wall cleanouts in finished areas shall all be installed at the same height for a uniform appearance throughout the facility. Heights shall be selected so as not to interfere with base molding or other trim work; verify with other trades.

C. Clearances and Access: Install cleanouts so as to assure proper clearances as required by governing code. Where cleanouts occur in concealed spaces provided extensions to floors above or to walls to allow access. Provide wall access covers or access doors for all wall cleanouts. See Section 20 05 00 for access doors.

D. Outside Building: All cleanouts located outside shall be provided with an access housing located in a 24" x 24" x 6" thick concrete pad, flush with (or up to 1/4” above) the adjacent finished grade. The pipe and cleanout shall be independent of this access housing and pad.

3.4 TESTING AND INSPECTION

A. All piping shall be tested, inspected and approved prior to being concealed or covered.

B. Testing shall be by water or air, and comply with code.

C. Testing shall be witnessed by the code official, the Owner’s representative (at their option), and the Engineer (at their option). Prior to beginning testing confirm with the Owner and Engineer their level of involvement in the testing process and extent of witnessing; where they will be witnessing the testing notify them at least 72 hours in advance of the test and confirm their availability; coordinate and reschedule as necessary and arrange mutually agreed upon times for the tests and witnessing to occur.

D. Water Testing:
   1. Fill system with water so that there is no less than 10 feet of head above the highest system section being tested.
   2. System shall hold pressure for a period of at least 15 minutes with no leakage before the inspection starts.
   3. The system shall be inspected and shall hold tight with no leakage at all points.

E. Air Testing:
   1. Pressurize system with air so that there is no less than 5 psig of air pressure in the system.

2. System shall hold pressure for a period of at least 15 minutes without the introduction of additional air before the inspection starts.
3. The system shall be inspected and shall hold tight with no leakage at all points.

F. All leaks shall be eliminated and the system re-tested before proceeding with work or concealing pipe.

G. All repairs to piping shall be with new material and no caulking of screwed joints or holes is allowed.

END OF SECTION

SECTION 223300 – DOMESTIC WATER HEATERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.

B. Requirements of Section 20 05 00 apply to this Section.

1.2 WORK INCLUDED

A. Water Heaters.

1.3 REFERENCES

A. NSF 61: Drinking Water System Components – Health Effects.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer's product data for all items to be used.

B. Manufacturer's Instructions: Submit manufacturer's installation instructions for water heaters.

1.5 GENERAL REQUIREMENTS

A. NSF: Manufacturers shall fabricate and label equipment components that will be in contact with potable water per NSF 61.

B. Quality Assurance: Provide quality assurance checks specified in Section 20 05 00 prior to ordering products.

C. Code Compliance: Water heater shall comply with code. Provide water heater with all proper ratings, accessories and features as needed to comply; including but not limited to: unit efficiency, insulation levels, modular demand response communications port (e.g. ANSI/CTA-2045 or as enforced by the AHJ), safety devices, controls, heat traps, labeling, etc.

D. Temperature Settings: Water heaters shall be able to be set at a leaving (or system) water temperature over a range. Low setting shall be at least 90 degrees F or 10 degrees F lower than the system water temperature indicated on the plans (whichever is lower). High setting shall be at least 20 degrees higher than the system water temperature indicated on the plans.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Products shall comply with Section 20 05 00, Paragraph 2.1, Acceptable Manufacturers.

B. Water Heaters – Electric Instantaneous: Chronomite, Stiebel Eltron.

2.2 WATER HEATERS – ELECTRIC INSTANTANEOUS

A. Type: Electric, point-of-use instantaneous type heater.

B. Construction: Stainless steel or nichrome heating elements, celcon or copper or stainless steel waterways, with plastic (or steel) enclosure. Unit shall be UL listed and meet all applicable codes.

C. Capacity: Shall have capacity as indicated on the plans. Unit shall be for use with 110 deg F outlet temperature (unless noted otherwise), flow rates from 0.5 to 3.0 gpm, and operate with as low as 25 psig inlet water pressure.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Comply with Section 20 05 00. In accordance with manufacturer's written installation instructions, code, applicable standards, and best construction practices.

B. Coordination: Coordinate the work with all trades that may be affected by the work to avoid conflicts and to allow for an organized and efficient installation of all systems.

C. Connections: Connect and install all items shipped loose with equipment and as needed for proper system operation. Provide and connect all utilities and services to equipment as required for proper equipment and system operation.

D. Protection, Operation and Maintenance: Comply with Section 20 05 00. Protect water heaters against use and damage during construction; provide guards and/or boxing as required.

E. Vacuum Breakers: Provide vacuum breakers on water heaters where water heaters serve fixtures located below the water heater height.

F. Clearances: Provide as required for maintenance or as required by Code; whichever is greater. Water heater sizes exceeding any of the following shall have minimum 18" clearance all around (or as required by Boiler Code for boilers; whichever is greater): 120 gallons, 160 psi, or 200,000 BTU/hr input.

G. Anchorage: Provide seismic strapping and anchorage of water heater to building structure.

H. Inspection: Inspect water heaters and connecting systems to confirm water heaters and system are ready for start-up and operation. As a minimum, check for: proper voltage and phase, correct gas pressure and regulator setting (for gas fired units), correct electrical connections, complete control connections, relief valve correctly sized and discharge piped, drain provisions installed,

valving to water heater accessible and ready to be set in operating positions, and other items as listed by the manufacturer are properly provided and connected.

I. Start-Up and Adjustment: Put water heater into service following manufacturer start-up procedures. Adjust water heaters for proper operation; set thermostats for required supply temperature. Check operation of water heater by flowing water and confirming proper operation.

END OF SECTION

SECTION 224000 – PLUMBING FIXTURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.

B. Requirements of Section 20 05 00 apply to this Section.

1.2 WORK INCLUDED

A. Plumbing Fixtures and Trim.

B. Installation/Connection of Equipment Specified Elsewhere.

C. Adjustment and Cleaning.

1.3 DEFINITIONS

A. "Plumbing Brass" means "P-traps, stops, strainers, tailpieces, flanges, and other brass fittings and accessories NOT including faucets or stops."

B. "Trim" includes all plumbing brass items, faucets, and any fixture accessories.

C. "Accessible" refers to the American's with Disabilities Act, and infers that these fixtures will meet Federal and local code requirements.

D. "Lead-Free" means not containing more than 0.2% lead in solder and flux; and not more than a weighted average of 0.25% lead in wetted surfaces of pipes, pipe and plumbing fittings and fixtures.

1.4 REFERENCES

A. UPC: Uniform Plumbing Code.

B. NSF/ANSI Standard 61: Drinking Water System Components – Health Effects.

1.5 SUBMITTALS

A. General: All submittals shall comply with Section 20 05 00.

B. Product Data: Submit product data for all plumbing fixtures, plumbing trim, and water heaters.

1.6 GENERAL REQUIREMENTS

A. Fixture Quality: Provide new fixtures and fittings, approved, free from flaws and blemishes with finished surfaces clear, smooth and bright. Visible parts of fixture brass and accessories, and all items located in accessible cabinet spaces, shall be heavily chrome plated. All stops, P-traps and items exposed to view shall be chrome plated (except where specifically noted otherwise).

B. Code Compliance: All products and connections shall be in compliance with code, local Utilities Department standards, and Health Department requirements.

C. Off-The-Floor Mounted Fixtures - Movement:
1. General: Off-the-floor (i.e. wall) mounted fixtures shall be supported, anchored, and braced in a manner so that the fixture does not move more than the values indicated below with the imposed forces as indicated; nor shall the fixture or associated fittings leak or suffer damage of any kind. Deflection shall be measured at the front most part of the fixture (i.e. the point on the fixture furthest away from the wall containing the fixture supports), with the load imposed at the same location as the measured deflection. Deflection shall not be exceeded in any direction with the force imposed in any direction.
2. Other Fixtures: 1/16-inch with a 150 pound force.

D. Spare Parts: Provide two spare stop valves.

1.7 QUALITY ASSURANCE

A. General: Provide quality assurance checks specified in Section 20 05 00 prior to submitting product data. By submitting products for Engineer's review, the Contractor is confirming that such checks have been performed and that the products are suitable for the intended installation and use.

B. Fixtures:
1. Types: Verify specified fixture types with the Architectural and Plumbing drawings to confirm the requirements are consistent (e.g. fixtures are wall mounted versus floor mounted type, locations of ADA fixtures match, etc.). Where conflicts occur clearly identify the issue on the fixture submittal along with a proposed resolution; or resolve prior to making the submittal by the project RFI process.
2. Space Verification: Prior to ordering any fixtures or making submittals, Contractor shall check the drawings and verify that all fixtures will fit the space available (i.e. fixtures fit any cabinets fixtures are to be installed in; fixtures have adequate access clearances for proper use; etc.).

C. Lead-Free Requirement: All items in contact with potable water shall be lead free. Fixtures used to dispense potable water for drinking shall meet the requirements of NSF/ANSI 61.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Products shall comply with Section 20 05 00, Paragraph 2.1, Acceptable Manufacturers.

B. Water Closets: Kohler, American Standard, Eljer, Mansfield.

C. Vitreous china (other than water closets) and enameled cast iron fixtures: American Standard; Kohler, Eljer, Mansfield.

D. Water Closet Seats: Church; Beneke; Olsonite; Kohler; Bemis.

E. Carriers: Josam; J.R. Smith; Mifab; Wade; Zurn.

F. Drinking Fountains: Haws; Elkay.

G. Floor Drains and Floor Receptors: J.R. Smith; Zurn; Josam; Mifab.

H. Plumbing Brass: McGuire; American Standard; Brasscraft; Dearborn Brass; Chicago Faucet; Crane; Eljer; Frost; Kohler; Speakman; Symmons; T & S Brass; Elkay; ProFlo.

I. Faucets: Chicago Faucet (no substitutions).

J. Stops: McGuire; Brasscraft; ProFlo; Chicago Faucet.

2.2 PLUMBING FIXTURES

A. General:
1. Plumbing Fixtures are listed below by reference numbers, corresponding to the reference number adjoining these items on the drawings.
2. All vitreous china and enameled cast iron fixtures shall be finished white unless specifically noted otherwise.
3. All stainless steel sinks shall be sound deadened, and shall have faucet ledge (except where noted specifically without ledge).
4. In interests of Owner's Standardization, fixtures of similar type shall be product of one manufacturer; trim of similar type shall be product of one manufacturer.

B. Water Closets:

1. P-1A Water Closet – Floor Mount - ADA: Water Closet: American Standard "Cadet Pro", No. 215AA.104, vitreous china, elongated bowl, floor mounted, flush tank with tank locking device, right side trip lever, 1.28 gallon flush.

   Seat: Kohler "Lustra", No. K-4670-SC, white plastic elongated seat, open-front and stainless steel self-sustaining check hinge.

2. P-1A Water Closet – Floor Mount - ADA: Water Closet: Same as P-1A with left side trip lever.

   Seat: Same as P-1A

3. ADA: Configure and install for ADA access. Verify with Architectural drawings for mounting heights and off-center stall dimensions. Provide with flush valve so that handle is on wide side of stall.

C. Lavatories:

1. P-3A Lavatory - Wall Hung - ADA: Lavatory: Kohler “Kingston”, No. K-2005, 18-1/4” x 17-1/4”, vitreous china, with single faucet hole, for use with concealed arm carrier.

2. Plumbing Brass: Kohler No. K-7129 lavatory drain with perforated grate and 1-1/4" tailpiece; Kohler No. 9000 1-1/4" cast brass "P" trap with cleanout; stops and risers per “Specialties” in this specification section.

3. Faucet: Chicago Faucet No. 802-VE2805 metering faucet with MVP push handles, 4” centers, 1/2 GPM spout outlet/aerator, adjustable self-closing cartridge, 4" spout.

4. Cover: TrueBro Model Series 2018 ADA-compliant, high-impact UV-protected vinyl cover, custom factory pre-cut to fit lavatory.

D. Drinking Fountains/Bottle Fillers:

1. P-8A Drinking Fountain - ADA: Elkay Model No. LZWS-LRPBM28K, dual bowl, wall mounted drinking fountain, barrier free and wheelchair accessible where installed above a wheelchair access, front mounted push button valve, vandal-resistant chrome-plated bubbler head and waste strainer, hanging brackets, lead free. Provide with water bottle filling station with cooler. Cooler capacity of 8 gph at 80 deg F inlet, 90 deg F ambient, and 50 deg F outlet water. Shall have no-touch sensor activated operation and LED interface display, maximum 370 watts, 120 volt/1 phase. Provide with inlet filter certified to NSF/ANSI 42 and 53, rated for 3000 gallons.

E. Floor Drains:

1. P-11A Floor Drain: J.R. Smith No. 2010-B cast iron body floor drain, with nickel bronze adjustable strainer head, square nickel bronze grate, vandal proof screws, reversible flashing collar, and trap primer connection. Size drain outlet to match pipe size shown on drawings.

2.3 OFF-THE-FLOOR FIXTURE SUPPORTS (CARRIERS)

A. General: Type to suit fixture and building construction, with added anchors, bracing, wall backing and accessories to comply with maximum specified fixture movement. Concealed in wall. Provide with all hardware and accessories for proper fixture support to suit the application. See Section 20 05 29 for hangers and supports.

B. Lavatories: Steel construction, with 1-inch x 3-inch rectangular steel uprights welded to 4-inch square steel base plates for floor anchoring, and arms for lavatory support. J.R. Smith Figure 0700 and 0710 with added anchors, bracing, wall backing and accessories to comply with maximum specified fixture movement.

C. Other Fixtures: Manufacturers' standard carrier to suite fixture and application, steel construction with anchors, bracing, wall backing and accessories to comply with maximum specified fixture movement.

D. Non-Standard Fixtures: For fixtures that standard carriers are not manufactured for provide 3/16" thick steel back plate for block walls and wood stud walls; or a 2" x 2" x 1/4" angle welded to at least four studs for metal stud walls, with through bolts and fasteners to support fixture and comply with maximum specified fixture movement.

2.4 SPECIALTIES

A. General: Unless indicated otherwise, the following fittings and materials (i.e. specialties) shall be used.

B. Fixture Traps: 17 gage seamless chrome plated cast brass tubing, with 2 inch minimum seal, cast brass slip nuts, size as required by Uniform Plumbing Code (unless a larger size is indicated), and configured to suit the application. Provide with cleanout where indicated or required by code.

C. Exposed Piping and Fittings: In finished areas and in accessible cabinets, provide piping with chrome plating or sleeved with chromed sleeves or of stainless steel construction/finish; all chrome to have a bright polished finish. No exposed copper allowed (includes accessible cabinet areas).

D. Stops: Quarter turn ball valve type, chrome plated, UPC compliant, with low lead brass body, rated for minimum 125 psi operating pressure and temperature of water used with plus 20 deg F. Size and configuration to suit application. Provide with loose key where installed in areas with public access.

E. Risers: Flexible braided steel type; rated for 125 psig.

F. Escutcheons: See Section 20 05 00.

G. Hot Water Temperature Limiting Valve: See section 22 11 00.

H. Sealant: See Section 20 05 00. Sealant at fixtures shall be the silicone type, color to match fixture.

PART 3 - EXECUTION

3.1 INSTALLATION OF FIXTURES

A. General: All fixtures shall be completely connected to piping as needed to make a complete and operable installation.

B. Fixture Locations: Mounting heights and locations of fixtures shall be as shown on the Architectural drawings and in accordance with Contract Document requirements. Locations shall be verified and coordinated with the various trades affected by the installation of these

fixtures. When none indicated or shown, obtain mounting location and heights from the Architect/Engineer prior to installation. Floor drains shall be installed in proper locations and coordinated with floor slopes so that drains are set at low points to allow for floor drainage. Floor receptors (or floor sinks) shall be set flush with floors to allow drains to serve as both indirect drain receptors and as floor drains (unless noted otherwise or required to be elevated by code).

C. Rough-In: Determine rough-in location of fixture utilities to suit fixture location, fixture dimensions, elements of construction (i.e. beams, studs, electrical, ducts, etc.), access requirements, casework dimensions, items which may drain/connect to fixture, use of fixture, and related considerations. The fixture rough-in locations indicated on the plans is schematic, and is not to be used for final rough-in purposes. Coordinate fixture locations with other systems so that either conflicting items are relocated or fixture locations are adjusted to suit.

D. Offsets: Provide offsets in piping to fixtures to accommodate building systems. Such offsets shall include off-setting waste piping into cabinet bases (in kick space where possible) to accommodate beams located directly below walls behind fixtures.

E. Carriers: All off-the-floor (i.e. wall) mounted fixtures shall be installed with supporting carriers and additional anchors, bracing and supports to transmit fixture loads to the floor and building structure without exceeding the maximum specified fixture movement. Prior to concealing carrier and associated supports review adequacy of support system with Architect/Engineer.

F. Fixture Sealant: Where fixtures abut to walls, floors, and cabinets seal all joints with a uniform fillet bead of sealant. Provide at other locations as recommended by fixture manufacturer.

G. Protection: Protect fixtures against use and damage until project substantial completion; provide guards and/or boxing to protect.

3.2 INSTALLATION OF SPECIALTIES

A. Escutcheons: Provide escutcheons at each point where an exposed pipe or other fitting passes through walls, floors, backs of cabinets, or ceilings.

B. Stops: Provide stops in water connections to all fixtures/equipment, except where a stop valve is integral to the fixture (e.g. flush valves) and in water connections to all items not served by another valve.

C. Hot Water Temperature Limiting Valve: Install on all lavatories, hand wash sinks, bathtubs, showers, whirlpools, bidets and at fixtures required by Code (reference UPC Chapter 4); set for 115 deg F maximum delivery temperature. Test and adjust for proper operation and submit written report documenting work performed.

3.3 INSTALLATION OF EQUIPMENT SPECIFIED ELSEWHERE

A. General: Refer to the drawing schedules, architectural specifications and related information in the Contract Documents. Under this section of the specifications provide and install and/or connect all plumbing services indicated to be by Mechanical (M), Plumbing (P), or by Divisions 20, 22, or 23.

B. Installation: Comply with installation requirements for fixtures and specialties per this specification Section.

C. Complete Connections: Provide all water supply stops and appurtenances necessary to make a complete installation of items. All lines between the stops and fixtures/equipment shall be hard piped, chrome plated and sized as indicated (or, where not sized, size per the UPC or manufacturer).

D. Exposed: All waste, drain, indirect drain, and traps exposed to view shall be chrome plated or sleeved with chromed sleeves.

3.4 ADJUSTMENT AND CLEANING

A. Cleaning: After completion of installation remove all labels and thoroughly clean all fixtures, trim and fittings.

B. Adjustment: Adjust all flush valves, fixture stops, faucets, valves, and associated plumbing items as necessary for the proper operation of all fixtures and equipment.

END OF SECTION

SECTION 230933 – ELECTRIC AND ELECTRONIC CONTROL SYSTEM FOR HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.

B. Requirements of Section 20 05 00 apply to this Section.

1.2 WORK INCLUDED

A. Control System Design.

B. Control System for Building Heating, Ventilation, Air Conditioning, Exhaust.

C. Control Devices, Components, and Wiring.

D. Testing, Adjustment, and Commissioning.

E. Owner Training.

1.3 SUBMITTALS

A. General: Shall comply with Section 20 05 00.

B. Product Data: Submit product information on all items to be used.

C. Shop Drawings: Submit a complete set of shop drawings prior to installation containing the following information: interconnect drawings showing all wiring and control connections; control panel details; arrangement of devices in panels; schedule of dampers with sizes and where used; sequence of operation for all equipment; location of all control devices on scaled building plans; and list of actuators with sizes and where used.

D. Labeling: Submit list of proposed component labeling.

E. Operation and Maintenance Manuals: See Section 01 77 00. In addition to the information required by that Section, provide (for inclusion in the Manual) the following:
1. System description.
2. Complete sequence of operation.
3. Reduced size (11" x 17") copies of record drawings.
4. Submittal data on all products.

1.4 GENERAL REQUIREMENTS

A. Design and Installation: The control system is design/build type; all design is by the contractor with the system providing the features and sequences specified. The entire control system shall be designed and installed by skilled control system designers, electricians and mechanics, all of whom are properly trained and qualified for the work they perform.

B. Sole Responsibility: One single Contractor shall be responsible to design, furnish and install the complete Section 23 09 33 control system.

C. Sequence: System shall have sequence of operation as specified in Section 23 09 93.

D. Code Compliance: Devices shall have features and control capabilities as required to comply with code.

1.5 WARRANTY

A. Warranty: After completion of the installation of the control system and acceptance by the Owner, the system shall be warranted as free against defects in manufacturing, workmanship and materials for a period of two years from date of substantial completion. In addition, the system shall be warranted to provide the sequence of operation and basic features specified, with the accuracy and flexibility also specified. The system shall be repaired or replaced, including materials and labor, if in Owner's and Engineer’s reasonable opinion, system is other than as warranted.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Products shall comply with Section 20 05 00, Acceptable Manufacturers.

B. Thermostats and Time Clocks (Non DDC): Honeywell, Paragon.

C. Actuators: Belimo, Honeywell, Siemens, Johnson Controls.

D. Dampers: Ruskin, Greenheck.

E. Control Accessories: Idec, Hoffman, McDonnell, Tridelta, Edwards, Mamac, Penn, Belimo, Honeywell, Johnson Controls, Leviton, Arrow-Hart, Alerton.

2.2 BASIC SYSTEM

A. System Type: The system shall be an electronic or electric type.

2.3 THERMOSTAT AND TIMECLOCK

A. Programmable Thermostat: 7-day (or 365-day) programmable solid state type, LCD display with backlight, specifically designed for commercial HVAC use. Unit (and related relays, control modules, and sensors) shall allow for 1st-stage economizer cooling, 2nd stage unit cooling, 1st

stage heating, 2nd stage heating and provide other features as required by the sequence of operation. Thermostat shall have means to bypass time clock, have Auto-Cool-Off-Heat switching, setpoint adjustments, and time/day adjustments. Unit shall also have capability for averaging multiple remote thermostat sensors (where indicated). Display shall indicate use of auxiliary heat (for heat pump applications) and have other features. Honeywell T7351/T350 Series, with specific model as required to provide the specified sequence and suit the HVAC equipment used with.

B. Remote Thermostat Sensor: Remote temperature sensor for use with programmable thermostat, specifically designed for commercial use. Unit shall have space temperature sensor, unoccupied mode pushbutton override with LED, and temperature setpoint adjustment. Honeywell T7771 Series, or approved.

C. Thermostat Guard: Hinged slotted thermostat guard, acrylic construction, with tamper resistant keyed lock (key not removable unless in locked positions), wall base/backing plate, rectangular shape, size to suit thermostat used with. Provide with two keys each guard. Honeywell TG5 Series, or approved.

D. Accessories: Provide sensors, mounting flanges/rods/gaskets, relays, wiring, terminal, transformers, and accessories as required for the specified sequence. Mixed air and return air sensors shall be the averaging type with a sensor element type to sense a representative sample of the medium being controlled. Provide sensors as required to work with economizer controls.

2.4 CONTROL DAMPERS

A. Type: Parallel blade or opposed blade type, as selected by contractor to best suit application (unless a specific type is indicated).

B. Leakage: Class 1A leakage rated in accordance with AMCA 511 (or better, as required by Code).

C. Construction: Construct of galvanized steel, except where installed in ducts of stainless steel or aluminum construction or handling corrosive air, shall be of stainless steel or aluminum construction (to match duct material). All materials in contact with the airstream shall be suitable for the conditions without deterioration. Provide special coatings as necessary to provide corrosion resistance. Frame shall be minimum 16 gauge.

D. Blades: Single blade type, not exceeding 6 inches in width,16 gauge, with neoprene, extruded vinyl or butyl rubber edge seals and flexible metal jamb seals; linkage interconnecting all blades and actuator axle.

E. Bearings: Nylon, molded synthetic or oil impregnated sintered metal bearings (or other materials as conditions require).

2.5 ACTUATORS

A. Type: Brushless DC motor type controlled by a microprocessor.

B. Operation: Compatible with control devices used with to provide specified sequence and system features. Run time shall be constant, independent of torque. Actuator shall have manual

positioning mechanism and control direction of rotation switch accessible on its cover. Provide with auxiliary switches as required for sequence of operation. Actuator shall be proportional or two position type, as required for application.

C. Sizing: Provide actuator with sufficient power and torque to suit items being controlled and allow proper operation against system pressures liable to be encountered. Actuator shall be capable of driving controlled items from full closed to full open in less than 15 seconds.

D. Spring Return: All actuators shall spring return upon power interruption: The spring return position shall be a “fail safe" position as dictated by freeze, fire, temperature protection, energy saving, or safe operating requirements. Outside air dampers shall spring return closed; return air dampers shall spring return open.

E. Accessories: Units shall be complete with all linkages, brackets, and hardware required for mounting and to allow for proper control and operation.

2.6 PRESSURE SENSOR/TRANSMITTERS

A. Air Differential Pressure Sensor: Electronic transducer, incorporating linear variable differential transformer type sensing element with two-wire 0-10 VDC transmitter. Accuracy shall be +/- 2% of full scale. Submit chosen spans for review.

B. Liquid Differential Pressure Sensor: Single pole, single throw switch, bellows type, with adjustable range, suitable for application intended.

C. Air Velocity Transmitter: Shall be a duct mounted instrument that measures the difference between total pressure and static pressure to get velocity pressure. Measurement shall be by a pitot tube located in the moving air stream or by a duct mounted air flow measuring station. Air velocity devices on inlet of air terminal units shall be furnished with units. The transmitter shall be an industrial quality device that produces a linear output directly proportional to the input utilizing an integral square root extractor. The air velocity span shall be a segment of the range between 200 and 5000 feet per minute.

2.7 ACCESSORIES

A. Wiring and Conduit: Shall comply with Division 26 specifications and with code. Wiring that performs code required life safety shutdown of equipment or fire alarm interface shall comply with NFPA standards and local codes for fire alarm system wiring.

B. Control Cabinet: Wall mounted, NEMA construction type to suit application, minimum 14 gauge sheet metal, hinged front door with latch. Size as required to house controls.

C. Relays: Shall be rated for the application, with a minimum of two sets of Form C contacts, enclosed in a dust-proof enclosure. Relays shall have Hand-Off-Auto switch, and LED’s (or pilot lights) to indicate the energized mode. Relays shall be rated for a minimum life of one million cycles. Operating time shall be 20 milliseconds or less, with release time of 10 milliseconds or less. Relays should be equipped with coil transient suppression devices to limit transients to 150% of rated coil voltage. Contact rating, and configuration selected to suit application.

D. Miscellaneous Components/Sensors/Transmitters/Transformers: Shall be manufacturer's standard, designed for application in commercial building HVAC control systems, compatible with other components so as to provide sequence of operation specified.

E. Condensate Overflow Switch: Overflow switch to detect high condensate level to stop unit operation and indicate an alarm, low voltage, PVC or ABS construction, with switch rated for voltage/amperage used with. Style to best suit application (i.e. in drain pan type, in drain line type, or type that installs in unit auxiliary drain outlet); selected by Contractor subject to Engineer review. Little Giant Nos. ACS-2, -3, -4, or -5 (or approved equal).

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Provide all devices, sensors, relays, switches, dampers, actuators, conduit, tubing, wiring, motor starters and all other devices required to provide a complete integrated control system with the sequence of operation and features as specified. It is the Contractor's responsibility to coordinate with other trades for the installation of control devices in systems installed by others.

B. Installation: Install all control components in accordance with manufacturer's instructions and recommendations and best professional practices.

C. Coordination: Coordinate work with other trades to ensure that all trades have the information necessary so that they may properly install any necessary control components, interconnect with control components, and install their work to accommodate controls. Identify all items requiring ceiling or wall access doors (or other special requirements) to trade installing access doors or performing related work.

D. Space Requirements and Locations: Carefully check space requirements and coordinate with other trades to ensure that items can be installed in the allotted spaces, including above finished suspended ceilings. Adjust locations of panels, equipment, devices, and the like, to accommodate work and prevent interferences. Determine the exact route and location of wiring, conduit and other control devices prior to beginning work.

E. Mounting: Mount controls adjacent to associated equipment on vibration free elements on free standing fabricated supports; mount and locate for best access.

F. Control Cabinets: All electrical devices, relays, and components shall be installed in protective covers (i.e. control cabinets), except where installed concealed above ceilings a cover is not required. Controls/devices shall be logically assembled in cabinet, with all devices and cabinet labeled.

G. Thermostats: Room thermostats shall be mounted 4'-6" above finished floor unless indicated otherwise. Thermostats shall connect to the HVAC unit serving the space the thermostat is located in, unless indicated otherwise. Not all thermostats are shown on the drawings and those shown are preliminary only. Contractor shall indicate all final thermostat locations on submittal drawings. Contractor is responsible to coordinate locations to avoid tackboards, casework, and other interferences.

H. Power: It shall be the responsibility of this Contractor to provide power for all control devices requiring power. Coordinate with the Division 26 Contractor to arrange for necessary power circuits. All control devices shall obtain power from circuits dedicated to control power.

I. Wiring, Conduit and Electrical:
   1. General: Provide all electrical wiring and devices in accordance with applicable codes and Division 26 requirements.
   2. Conduit: All wiring shall be installed in conduit and in accordance with Division 26 specifications, except that low voltage wiring within ceiling plenum spaces, mechanical mezzanines, and attics may be installed without conduit. Wiring in walls shall be in conduit.
   3. Wire Labeling: Label or code wiring at each end to show location of the opposite end. Each point of all field terminal strips shall be permanently labeled or coded to show the instrument of item served. Color coded cable with cable diagrams may be used to accomplish cable identification and terminal strip.
   4. Service Loop: Provide minimum of 6" extra wiring at all wiring terminations for ease of future maintenance/servicing. Such extra wiring shall be neatly coiled/bundled to allow for uncoiling when the connected equipment is serviced.
   5. Workmanship: Install all conduit and wiring parallel to building lines, in neat bundles, supported at not less than 5 foot intervals.

J. Component Labeling: All control components, except regular room thermostats, shall be equipped with name plates to identify each control component. Components in finished rooms shall be labeled as to generic item controlled for better user understanding; other devices shall be labeled with the same designation which appears on the Control Diagrams. Contractor shall submit list of proposed labeling prior to installing. Reference Section 20 05 00.

K. Thermostat Setpoints: Thermostat Setpoints (all adjustable) shall be as follows unless indicated otherwise:

Occupied Heating	70 degrees F
Unoccupied Heating	65 degrees F
Occupied Cooling	75 degrees F
Unoccupied Cooling	85 degrees F

L. Motor Starters: Shall be by Division 26; except for loads 1/2 hp and less which shall be by this Section.

M. Device Duct Installation: All control devices installed in ductwork shall be positively anchored and attached to the ductwork by mechanical means (fasteners, straps, unistrut, etc).

N. Miscellaneous Controls: Provide all miscellaneous control items as noted in the Contract Documents. Provide all necessary control wiring between items for proper control.

O. Comfort Adjustments: See Section 20 05 00 Part 3 for requirements.

P. Condensate Overflow: Provide all cooling coils (except not required for room exposed wall mounted AC units) with field installed condensate overflow switches wired to stop cooling unit operation upon detection of a high condensate level.

3.2 INSTALLER COMMISSIONING

A. General: The commissioning specified in this paragraph is independent and separate of the commissioning work of Section 20 08 00 and is to be provided by the Section 23 09 33 system installer.

3.3 OWNER INSTRUCTION

A. Owner Instruction: Provide instruction to Owner on the operation and maintenance of the control system. Provide field demonstrations and show Owner the locations of all control devices; explain and demonstrate how system adjustments are made; explain and demonstrate system sequences of operation.

END OF SECTION

SECTION 230993 – SEQUENCE OF OPERATION FOR HVAC CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.

B. Requirements of Section 20 05 00 apply to this Section.

1.2 WORK INCLUDED

A. Sequence of Operation.

1.3 SUBMITTALS

A. General: Shall comply with Section 20 05 00.

B. Sequence: Submit complete description of sequence of operation. Sequence submitted shall not be a direct copy of the sequence specified herein, but shall be written to reflect the actual control sequence provided.

C. Shop Drawings: Provide complete control system shop drawings; see Section 23 09 33

1.4 GENERAL REQUIREMENTS

A. Bidder Design: The control system is bidder design subject to the requirements of the contract documents.

B. Sequence Terminology: Wherever the control sequences refer to an article, device or piece of equipment in the singular number, such reference shall mean to include as many of such articles, devices, or equipment as are shown on the plans, required for the sequence, or required to complete the installation. Wherever the control sequence refers to an operating stage in the singular number, such reference shall mean to include as many stages as are specified for the equipment and shall mean analog (i.e. proportional) type control where specified for the equipment (reference drawings and equipment specifications).

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.1 GENERAL

A. General: Provide complete system with sequences of operation as specified herein.

B. Time Control: Control system shall provide time control (i.e. occupied/unoccupied/ warm-up modes switching) for all HVAC and exhaust equipment. Provide independent occupied/unoccupied schedules for each HVAC unit (unless noted otherwise), all fans having time schedule control, and all heaters. Except that exhaust fans serving adjacent restroom areas may share time schedules. Provide optimum start (i.e. warm-up mode initiation) cycle for each HVAC unit (unless noted otherwise).

C. Time Control Override: Provide local means for all HVAC equipment to override their central time schedule. Override shall be by push button, and shall place system in the occupied mode.

D. Warm-up Control: Control system shall provide warm-up switching for all HVAC units and items indicated as having a warm-up cycle.

E. Adjustability: All temperature setpoints and time control settings shall be adjustable.

F. Thermostats: Various thermostats are not shown on the drawings but are required per the sequence of operation specified. Coordinate with Engineer for location of all such thermostats prior to installing. Indicate proposed locations on submittals.

G. Miscellaneous Items: See plans for units with motorized dampers in the ducts and miscellaneous other items requiring control.

H. Missing Sequences: Where no sequence of operation is indicated submit a proposed sequence to the Engineer for review. Such sequences shall match the intended equipment use, code, and ASHRAE standards for the type of equipment and application. HVAC equipment shall have control of heating/cooling operation by area thermostats and control of unit components (i.e. fans dampers) to allow for distribution of heating/cooling and control of ventilation air; fans and similar on/off items shall have time schedule and thermostat control (unless the application clearly implies a different method).

I. Settings:
1. Adjustability: All settings, setpoints, and differentials shall be adjustable. All setpoints indicated are initial settings.
2. Confirm Settings: Confirm with Owner all setpoints, all time schedules, and all other adjustable programming parameters before substantial completion.
3. Thermostat Setpoints: Shall be adjustable at operator's workstation, with initial settings as follows unless indicated otherwise:

Occupied Heating	70 degrees F
Unoccupied Heating	65 degrees F
Occupied Cooling	75 degrees F
Unoccupied Cooling	85 degrees F

J. Fire/Smoke Shutdown:
1. Smoke Detector: Provide necessary conduit, wiring, and accessories to shutdown each unit upon activation of that unit's smoke detectors. Connections shall be hardwired; independent of any control system logic, so that failure of control system or loss of

control system will in no way prevent the shutdown of each unit. In addition to shutting down the unit with the alarmed smoke detector, all equipment interlocked or served by that unit shall be off. Other units shall also shut-off as required to avoid building pressure differentials and similar undesirable effects.

2. Fire Alarm System: Shut-down all air handling equipment when the building fire alarm system goes into alarm. Contacts in the fire alarm system are available for this purpose. This shut-down may be accomplished by use of control logic and is not required to be hardwired but shall be of a fail-safe nature so as to provide the necessary shut-down in case of control failure and the control components shall be rated for such purposes (as required by the AHJ).

K. Automatic Restart:
1. General: Equipment shall automatically restart after being shut-off by a power outage, fire alarm, smoke detector, or similar alarm (or fault); upon clearing of the alarm (or fault). System shall revert to its normal operation for the conditions at the time of restarting.
2. Controlled Restart: Provide controlled re-start by building wing or building floor and in a manner to prevent pressure differentials, equipment issues, or other undesirable effects. Provide time delay on the re-start of equipment 5 HP (3.7 KW) and larger to minimize electrical surges.

L. Interlocks: Provide hard wired interlocks for equipment and control components that is specified (or required) to operate together. Provide time delay relay, where needed if delays in operation are required.

3.2 HEAT PUMPS

A. General: Control units' cooling, heating, system dampers (economizer), in proper sequence to provide a supply air temperature that will satisfy space conditions. Heating and cooling shall be properly sequenced so that there is no overlap between the use of heating and cooling. Space thermostat shall control units heating/cooling demand.

B. Occupied Mode:
1. Fan shall run continuously, at constant volume.
2. Heating: Heat pump shall operate as initial stage of heating, with unit's electric heater (or duct heater) as final stage. Multi-stage heat pumps shall provide heat pump heating in stages corresponding to unit stages. Electric heater shall be staged as indicated in schedule on drawings.
3. Cooling: Heat pumps with economizers shall use outside air as the first stage of cooling. Economizer shall be dry bulb or enthalpy type, using Outside Air (OA) temperature sensor, Return Air (RA) temperature sensor, and Mixed Air (MA) temperature sensor. Economizer shall be enabled only when OA temperature (or enthalpy) is less than the units RA temperature (or enthalpy). The OA/RA dampers shall be modulated as required to satisfy the MA sensor low limit setpoint (initial setpoint 55 degrees F). Heat pump shall operate in the cooling mode as the final stage of cooling. Multi-stage heat pumps shall provide added cooling stages corresponding to unit stages. Provide with economizer fault detection as required by code.
4. OA Dampers: OA dampers shall be in the minimum position when unit is in heating and under economizer control when unit is in cooling. OA damper shall not close below the

minimum airflow setting indicated on the plans; coordinate with balancer for minimum setting.

C. Unoccupied Mode: Fan shall not run continuously. Unit's fan and heating/cooling shall cycle on and off as required to maintain setback temperatures (same sequence as for the Occupied Mode). Outdoor air dampers shall be fully closed.

D. Warm-up Mode: Unit shall run as in the unoccupied mode (outdoor air dampers fully closed) until the space temperature has warmed up to the occupied mode heating setpoint, then unit shall operate as specified for the occupied mode.

E. Mode Control: Units' mode of operation shall be determined by unit thermostat time schedule and time schedule override; warm-up mode shall be initiated by thermostat's optimum start controls.

3.3 ELECTRIC HEATERS – CEILING

A. General: Heater shall be controlled by heater's integral thermostat. Heater shall be on once space temperature has fallen below setpoint, and shall be off once temperature has risen 2 deg F or more above setpoint.

3.4 ENERGY RECOVERY UNIT - SEQUENCE OF OPERATION

A. General: HVAC system controls shall provide time schedule control of the unit. Mode shall match the mode for the HVAC system which corresponds to the area served by the DOAS unit. Where the DOAS unit serves areas served by multiple HVAC units, the DOAS unit shall be in the occupied mode when any HVAC unit is in the occupied mode.

B. Occupied Mode:
1. Fans: Supply and exhaust fans on.
2. Outside Air and Exhaust Air Dampers: 100% open.

C. Unoccupied Mode: Unit shall be off.

D. Warm-Up Mode: Unit shall be off.

E. Duct Heater: Shall be controlled by a supply air duct temperature sensor with an outdoor air temperature lockout. Heater shall be on when supply air temperature is below setpoint and off when temperature is 2 deg F or more above setpoint. Initial setpoint shall be 70 deg F. Heater shall be off whenever the OA temperature is above the "OA Lockout" setpoint; initially set for 65 deg F. Control heater in stages (for heaters with multiple stages) or with proportional control (for SCR type).

3.5 MISCELLANEOUS CONTROLS

A. Water Heaters: Shall be controlled by integral thermostat provided with unit. Set for temperature as noted in water heater schedule.

B. Fire Alarm System Shutdown:

1. Provide necessary conduit, wiring, and accessories to shutdown each unit upon activation of that unit's smoke detectors (Smoke detectors are by Division 23 unless specifically shown on the electrical plans and Division 26 specifications). Connections shall be hardwired, independent of any control system logic, so that failure of control system or loss of control system will in no way prevent the fire alarm shutdown of the system. In addition to shutting down the unit with the alarmed smoke detector, all equipment interlocked or served by that unit shall be off. Other units shall also shut-off as required to avoid building pressure differentials and similar undesirable effects. Upon reset of alarmed device, system shall automatically return to normal, provide time delay start of equipment to prevent excess load starting at the same time.
2. In addition to the above specified hardwired fire alarm shut-down (which pertains to equipment with smoke detectors), provide the following: Shut-down all air handling equipment when the building fire alarm system goes into alarm. Zone contacts in the fire alarm system are available for this purpose. This added shut-down may be accomplished by use of control logic and is not required to be hardwired but shall be of a fail-safe nature so as to provide the necessary shut-down in case of control failure. Reset shall be same as that specified for hard-wired unit smoke-detector shut-down.

END OF SECTION

SECTION 232128 – HVAC CONDENSATE PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.

B. Requirements of Section 20 05 00 apply to this Section.

1.2 WORK INCLUDED

A. Cooling Coil Condensate Drains.

B. Overflow Drains.

C. Drain Pans.

D. Fabricated P-Traps.

E. Condensate Pumps.

F. Testing and Inspection.

1.3 SUBMITTALS

A. Submittals shall comply with Section 20 05 00.

B. Submit product information on all items to be used.

1.4 REFERENCES

A. ASME B 16.15: Cast Bronze Threaded Fitting Classes 125 and 250.

B. ASME B 16.18: Cast Copper Alloy Solder Joint Pressure Fittings.

C. ASME B 16.22: Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.

D. ASME B 16.23: Cast Copper Alloy Solder Drainage Fittings.

E. ASME B 16.29: Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings (DWV).

F. ASTM B 32: Solder Metal.

G. ASTM B 88: Seamless Copper Water Tube.

H. ASTM B 306: Copper Drainage Tube (DWV).

I. ASTM D 1785: Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.

J. ASTM D 2466: Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.

K. ASTM D 2564: Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems.

L. ASTM D 2665: Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Products shall comply with Section 20 05 00, 2.1, Acceptable Manufacturers.

B. Pipe and Fittings: Mueller, Cerro, Tyler, US Pipe, Charlotte Pipe and Foundry, Pacific States Pipe, Atlantic States, Spears Manufacturing, Cresline Northwest.

C. Fabricated P-Trap: Rectorseal.

D. Condensate Pumps: Little Giant.

2.2 PIPE AND FITTINGS - MATERIALS

A. Copper DWV Pipe and Fittings: Copper drainage tube per ASTM B 306. Wrought copper and wrought copper alloy solder joint fittings per ASME B 16.29; or cast copper alloy solder joint fittings per ASME B 16.23.

B. Copper Pipe and Fittings: Seamless copper water tube, Type L or M, per ASTM B 88. Solder joint wrought copper and bronze fittings per ASME B 16.22 cast copper alloy fittings per ASME B 16.18, and cast bronze threaded fittings per ASME B 16.15 with 95/5 tin-antimony solder per ASTM B 32.

C. PVC DWV Pipe and Fittings: Polyvinyl chloride drain waste and vent pipe and fittings per ASTM D 2665, with solvent cement joints. Solvent cement shall comply with ASTM D 2564.

D. PVC Pipe and Fittings: Polyvinyl chloride pipe, schedule 40, per ASTM D 1785. Solvent cement socket type fittings per ASTM D 2466. Solvent cement shall comply with ASTM D 2564.

2.3 PIPE AND FITTINGS - APPLICATION

A. Cooling Condensate Drains: Copper DWV, copper, PVC DWV, or PVC.

B. Overflow Drains: Copper DWV, copper, PVC DWV, or PVC. Except that handling acidic or corrosive fluids shall be PVC.

2.4 DRAIN PANS

A. Fabricate of G90 galvanized steel complying with Section 23 31 00; minimum 22 gauge. Pans shall be welded, with welds power wire brush cleaned and cold-galvanizing compound applied at areas where galvanized coating has been disturbed area. Seal liquid tight all seams. Provide with watertight drain connection, located low in pan; 3/4-inch or sized to match drain line indicated on plans (whichever is larger). Overflow drain pans shall be sized to be 3-inches larger in all directions than item served.

2.5 FABRICATED P-TRAPS

A. Type: Factory fabricated p-trap with dual cleanouts and clear trap, for cooling coil condensate. Rectorseal “EZ Trap” (or approved).

B. Construction: Fabricated of schedule 40 PVC, with transparent plastic trap portion. Portion connection to HVAC unit (or coil) drain shall consist of a PVC cross, with top and side cleanouts having caps with integral retaining strap and ring. Outlet portion shall consist of PVC tee fitting, with top portion able to serve as vent.

C. Size: 3/4-inch unless indicated otherwise. Trap heights shall be sized to suit HVAC unit static pressures, unit configuration (i.e. blow through or draw through), and be consistent with HVAC unit manufacturers installation recommendations.

D. Cleaning Brush: Provide with bristled flexible shaft cleaning brush, sized for cleaning of p-trap.

2.6 CONDENSATE PUMP

A. Type: Automatic condensate pump with integral tank; for pumping cooling coil condensate, combustion condensate and similar fluids. Little Giant VCMA, VCMX or VCL series (or approved).

B. Capacity: Pump shall be rated to pump minimum of 1.4 gallons per hour per ton of unit cooling capacity served (e.g. 10 ton unit shall have a 1.4 x 10 = 14 gph capacity) at 15 feet of head (unless a different capacity is indicated). Pumps serving combustion condensate shall have a capacity of 25 gph per 1000 MBH of equipment capacity at 15 feet of head (unless a different capacity is indicated). Tank shall be 1/2 gallon capacity (unless indicated otherwise). Unit shall be rated for continuous operation.

C. Construction: Tank body and pump shall be constructed of oil resistant polypropylene or ABS, with discharge check valve, and float for pump on/off control, factory wired.

D. Accessories: Provide with overflow safety switch for wiring to low voltage controls to stop HVAC unit on high condensate (or to indicate an alarm).

E. Electrical: Provide with integral electric motor, having thermal overload protection, for use with 115 volt or 230 volt (as required to suit available power) AC single phase power, with minimum 6-foot 3-prong grounded plug.

PART 3 - EXECUTION

3.1 GENERAL

A. Installation of all items shall comply with code, best professional practices, and manufacturers written installation instructions.

B. Provide all piping as indicated and as required for all drip pans, unit condensate drains, and unit p-traps, to all items requiring such drains (i.e. HVAC units).

C. Coordinate installation of items with all trades that are affected by the work to avoid conflicts.

D. Consult manufacturers data and drawings for information on equipment before beginning drain rough-in.

E. Verify points of connection, elevations, and grade requirements before beginning installation or ordering materials.

F. Trap all equipment items as required by code; provide proper venting for each trap as indicated and as required by code.

G. Run piping to nearest point of drainage, or as shown on drawings. Where routing is not shown, route to nearest point of proper drainage.

3.2 PIPE AND FITTINGS

A. All piping in finished areas shall be installed concealed unless specifically noted otherwise.

B. Install piping so as not to obstruct access to any items requiring routine service, maintenance, or inspection. Offset or reroute piping as required to clear any interferences which may occur. Prior to running any exposed piping, confirm with Architect/Engineer (unless is clearly noted to be ran exposed). Install exposed piping so as not to obstruct any portion of windows, doors, doorways, passageways, or items requiring service or access.

C. Consult all drawings for location or pipe spaces, ducts, electrical equipment, structural elements, ceiling heights, door items requiring access, openings, window openings, and other details and report discrepancies or possible conflicts to Architect/Engineer before installing pipe.

D. Install all drain lines with a slope of 1/4-inch per foot unless noted otherwise. Coordinate with AHJ if written approval is required for exceptions to 1/4-inch per foot slope.

E. Provide escutcheons where exposed pipe passes through walls, floors, or ceilings.

F. Install all piping parallel to equipment and nearby walls and in a neat, workmanlike manner. Horizontal straight runs of piping shall not deviate from straight by more than 1/4-inch in ten feet. Vertical piping shall not deviate from plumb by more than 1/8-inch in ten feet.

G. Do not run any piping above electrical panels (and similar electrical equipment). Provide offsets around such panels as necessary. Such offsets are typically not shown on the plans, but are required per this paragraph.

H. Prior to the joining of any section of pipe to a pipe run, the section shall be thoroughly cleaned inside and out, the ends shall be reamed to remove any cutting burrs and piping prepared as recommended by piping and fitting manufacturer.

I. Threaded Connections: Cut piping carefully, ream, thread and work into place without springing. Use TFE tape or lead and graphite lubricant (on male threads only).

J. Soldered Connections: Polish contact surfaces of fittings and pipes with emery cloth before fluxing male and female surfaces of joints. Steel wool and sandpaper not permitted for polishing.

K. PVC Pipe:
1. Solvent Joints: The outside of the PVC pipe shall be chamfered to a minimum of 1/16 inch at approximately 22 degrees. Chemicals used must penetrate the surface of both pipe and fitting which will result in complete fusion at the joint. Use solvent and cement only as recommended by the pipe manufacturer.
2. Plastic to Metal Connections: Work the metal connection first. Use a non-hardening compound on threaded connections. Use only light wrench pressure. Connections between metal and plastic are to be threaded utilizing female threaded adapters only, not male adapters.

3.3 TESTING AND INSPECTION

A. All piping shall be inspected and approved prior to being concealed or covered.

B. Provide testing as required by code. Testing shall be by water and shall comply with governing code. Testing shall be witnessed by the plumbing inspector and the Engineer's representative (at his option).

C. All leaks shall be eliminated and the system re-tested before proceeding with additional work or concealing pipe.

D. All repairs to piping shall be with new pipe and fitting material’s; no caulking of screwed joints or holes is allowed.

END OF SECTION

SECTION 233100 – HVAC DUCTS AND CASINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.

B. Requirements of Section 20 05 00 apply to this Section.

1.2 WORK INCLUDED

A. Environmental Ductwork Systems.

B. Flexible Duct.

C. Preparation of Duct for Service.

D. Duct Pressure Testing.

1.3 DEFINITIONS

A. Duct Sizes: All duct dimensions shown are inside clear dimensions. Where inside duct lining is specified or indicated, duct dimensions are to the inside face of lining.

1.4 QUALITY ASSURANCE

A. All work and materials shall comply with SMACNA-DCS, NAIMA-DLS, ASHRAE-F, IBC, IMC, NFPA-90A, NFPA-90B, and code. The most restrictive criteria governs.

B. Leakage Criteria: Duct system shall be constructed and sealed so that leakage does not exceed 3%.

C. Fabrication Proximity: The Contractor performing the work of this section shall have fabricating facilities located within 100 miles of the project site.

D. Drawing Review: Prior to beginning any work review all drawings, duct routing, duct connections, equipment configuration, equipment connection locations, building dimensions, available space for duct routing, equipment required access, work of other trades, and other work details to discover conflicts in anticipated duct arrangement and improper or incomplete connections. Review shall include the following: supply ducts not connected into return (or exhaust) ducts, ducts not crossed and improperly connected in shafts, air outlets/inlets connected to ducts, unit configuration compatible with planned duct connections, louver locations match architectural plans, adequate space available for duct sizes, selection of duct gauge/reinforcement is suitable for space available. Submit resolutions of such possible

conflicts as submittals with shop drawings of proposed solutions; written description in lieu of shop drawings is acceptable for minor issues.

1.5 SUBMITTALS

A. General: Comply with Section 20 05 00.

B. Product Data: Submit product data for duct lining, flexible duct, and factory fabricated items.

C. Shop Drawings: Submit shop drawings for all HVAC ductwork which is to be installed differently than as shown on the drawings.

D. Conflict Resolution: Submit additional shop drawings showing proposed resolution of conflicts after review of documents, proposed products, and again after review of field conditions and space available.

1.6 DUCT PRESSURE CLASS

A. Constant Volume Systems: Ductwork shall be constructed to the pressure class corresponding to 1.2 times the static pressure indicated for the fan which serves the duct system (plus or minus as appropriate); unless noted otherwise. (For example, a fan designed to operate at 1-inch wc static pressure would require 2-inch pressure class duct construction as 1-inch x 1.2 = 1.2-inch; 2-inch is therefore the required pressure class.)

1.7 REFERENCES

A. ADC-FLEX: Air Diffusion Council Flexible Duct Performance and Installation Standards.

B. ASHRAE-F: ASHRAE Handbook of Fundamentals.

C. ASTM A 653: Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot Dip Process.

D. ASTN C 916: Standard Specification for Adhesives for Duct Thermal Insulation.

E. ASTM A 924: General Requirements for Steel Sheet Metallic-Coated by the Hot-Dip Process.

F. ASTM E 84: Standard Test Method for Surface Burning Characteristics of Building Materials.

G. IMC: International Mechanical Code.

H. NAIMA-DLS: North American Insulation Manufacturers Association Fibrous Duct Liner Standards.

I. NFPA 90A: Standard for the Installation of Air Conditioning and Ventilating Systems.

J. NFPA 90B: Standard for the Installation of Warm Air Heating and Air Conditioning Systems.

K. SMACNA-DCS: SMACNA HVAC Duct Construction Standards, 3rd Edition.

L. UL 181: Underwriter Laboratories Factory-Made Air Ducts and Air Connectors.

M. UL 181A: Underwriter Laboratories Closure Systems for Use with Rigid Air Ducts.

N. UL 181B: Underwriter Laboratories Closure Systems for Use with Flexible Air Ducts and Air Connectors.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Products shall comply with Section 20 05 00, Paragraph 2.1, Acceptable Manufacturers.

B. Sheet Metal: All domestic manufacturers.

C. Spin-in Fittings and ATTO: Sheet Metal Connectors Inc., United McGill, Royal Metal Products, Airflow Products Inc.

D. Gasketing: Preson, Insulfab, Duraco.

E. Duct Sealant and Tape: Carlisle (Hardcast), Ductmate, Benjamin Foster, Grace Construction Products, United McGill, Polymer Adhesives Sealant Systems, RCD Corporation, Nashua, 3M.

F. Flexible Duct: Flexible Technology Inc., JP Lamborn Co.; Hart & Cooley, Thermaflex.

G. Acoustical Duct Lining: Johns-Manville.

2.2 GENERAL MATERIALS

A. Ducts: Construct of galvanized sheet steel, suitable for lock forming without flaking or cracking, conforming to ASTM A653 and A924, having a zinc coating of 0.90 ounces total per square foot for both sides of a sheet, corresponding to coating G90.

B. Fasteners: Steel construction, electroplated zinc coated, having strength properties adequate for the application, compatible with materials being joined, and in accordance with SMACNA-DCS. Where exposed to corrosive conditions shall be of Type 304 or 316 stainless steel. Type to meet duct pressure class and duct leakage requirements. Where used for the support and anchorage of ducts shall comply with Section 20 05 29, with independent test reports regarding strength.

C. Spin-in Fittings: Factory fabricated of galvanized steel with die-formed mounting groove and damper with raised damper quadrant where ducts are to be insulated. Collar length for flexible duct attachment shall be at least 2" long.

D. Air-Tight Take-Off Fittings (ATTO): Factory fabricated branch duct connector, of galvanized steel. Flange shall be 1-1/2” wide with 1/8” self-adhesive gasket and pre-drilled fastener holes. Collar length for flexible duct attachment shall be at least 2” long. Where used on round duct mains, shall be saddle type appropriately sized for main duct diameter.

E. Draw Bands:
   1. Metal: Worm gear type clamp, constructed of galvanized steel, stainless steel, or aluminum; minimum 1/2-inch wide band; suitable for 200 pound loading.
   2. Non-Metal: Nylon "zip-tie" with self-locking ability, designed for flexible duct usage, minimum 1/4 inch wide, rated for 175 pound load, suitable for temperatures from 0 to 185 deg F; listed per UL181B and labeled "UL181B-C".

F. Gasketing: Vinyl nitrile, vinyl neoprene, or neoprene nitrile PVC blend; designed for HVAC use with size to suit the application having minimum 1.5-inch width at equipment roof curb applications. Fire hazard rating not to exceed 25 for flame spread and 50 for smoke development per ASTM E 84.

G. Duct Sealant/Mastic: Water based duct sealant, listed per UL 181B-M and UL 181A-M, suitable for indoor and outdoor use. Fire resistant with a flame spread rating of 5 or less, and a smoke developed rating of 0. Sealant shall be resistant to ultraviolet radiation and ozone. Fiberglass mesh shall be minimum 0.006-inches thick, with minimum 9 x 9 weaves per inch, and 2-inch width; for use with mastic in sealing ductwork. Sealant system shall be suitable for duct system pressure class and materials used with. Carlisle Hardcast "Versa-Grip 181".

H. Foil Tape: Foil back adhesive tape, listed per UL181A-P and UL181B-FX, with listing labeled on tape outer foil face. Minimum 3-inch width for metal-to-metal applications; minimum 2-inch width for flexible duct applications. 3M No. 3340 or Nashua No. 324A.

2.3 DUCT FABRICATION

A. Duct Gauge and Reinforcement: Shall be as shown in SMACNA-DCS according to the pressure classification of the system and the duct dimensions; with heavier gauge duct used as required to minimize duct reinforcement to suit space available and other project constraints. In no case shall ducts be constructed of less than 26 gauge material.

B. Joints and Seams: Construct in accordance with SMACNA -DCS, code requirements, and these specifications (more stringent governs). Ducts shall be constructed and sealed so that the leakage criteria is not exceeded. Round ducts shall be the spiral seam type; except that branch ducts to individual air inlets/outlets less than 16" diameter may be of other types as allowed by SMACNA-DCS. Coordinate joint spacing with duct reinforcement requirements so that transverse joints having the required stiffness may be incorporated in the reinforcement spacing schedule. Round duct transverse joints shall be made with beaded sleeve joints or flanged connections in accordance with SMACNA-DCS; except that branch ducts to individual air inlets/outlets less than 16" diameter may use other joining methods as are allowed by SMACNA-DCS.

C. Elbows and Tees: Shall be long-radius type with a center-line radius not less than 1-1/2 times the width or diameter of the duct. Where space does not permit the use of long-radius elbows, short-radius or square elbows with turning vanes may be used. Elbows in round duct systems with duct pressure class above 2-inches shall be stamped type, welded segmented type, or standing seam segmented type.

D. Transitions: Increase duct sizes gradually. Transitions for diverging air flow shall be made with each side pitched out not more than 22.5 degrees. Transitions for converging air flow shall

be made with each side pitched in not more than 30 degrees. Except that eccentric transitions for round to flat oval may have up to a 45 degree pitch.

E. Branch Connections: Shall comply with SMACNA-DCS, and as required herein.
   1. Rectangular-to-Rectangular: Rectangular take-off with 45 degree angle on "inside" of take-off, minimum 4" length. Reference SMANCA-DCS Figure 4-6. Close corner openings.
   2. Rectangular-to-Round:
      a. Serving Individual Air Inlet/Outlet: Spin-in type connector or air-tight take-off (unless a different fitting type is specifically noted).
      b. Serving Branch Duct: Rectangular to round transition, with maximum degree pitch as specified for transitions. Rectangular end size shall have free area no less than round end. Rectangular connection to rectangular main shall be made as specified for "Rectangular-to-Rectangular" connections.
      c. Serving Individual VAV Terminal Unit: Conical type connector, with connector 2" larger on one end and maximum 15 degree pitch on sides.
   3. Round-to-Round:
      a. Serving Individual VAV Terminal Unit: Conical type connector (or conical tee fitting), with connection at the main duct 2" larger than the end serving the VAV terminal unit, and a maximum 15 degree pitch on sides; or "Lo-Loss" tee fitting, equivalent to that manufactured by United McGill.
      b. Other Connections: Air-tight take-off or constructed in accordance with SMACNA-DCS and recognized professional practices.
   4. Other Connections: In accordance with SMACNA-DCS and recognized professional practices.

F. Ductmate Systems:
   1. Rectangular Duct: Transverse duct joints may be made with Ductmate System, or approved equal. System shall consist of companion flanges of 20 gauge galvanized steel with an integral polymer mastic seal; corner pieces of 12 gauge G90 galvanized steel; 20 gauge G90 galvanized cleats; closed cell, high density gasket type; and galvanized carriage bolts with hex nuts. The flanges shall be securely fastened to the duct walls using self-drilling screws, rivets or spot welding. Fastener spacing shall be as recommended by the manufacturer for the size of duct and the pressure class. The raw duct ends shall be properly seated in the integral mastic seal. A continuous strip of gasket tape, size 1/4" x 3/4", shall be installed between the mating flanges of the companion angles at each transverse joint; and the joint shall be made up using 3/8-inch diameter x 1-inch long plated bolts and nuts. Galvanized drive-on or snap-on cleats shall be used at spacing recommended by the manufacturer.
   2. Round Duct: Transverse duct joints may be made with Ductmate "Spiralmate" system, or approved equal. System shall consist of galvanized steel round connector flanges (fitting inside each duct section to be joined) and an exterior galvanized steel closure ring with tightening bolt to form an airtight duct connection and join flanges together. Duct connector flanges shall have non-hardening integral mastic to seal between flanges and duct, and a neoprene gasket to seal flange faces.

G. Lined Ductwork:
   1. Rectangular Ducts: Contractor Fabricated ductwork with interior duct lining. Duct fabrication and liner installation shall comply with NAIMA-DLS. Lining material shall comply with paragraph titled "Duct Lining" in this specification section.

2. Round and Oval Ducts: Shall consist of acoustic insulation in between a perforated interior duct liner and solid exterior duct. Acoustic insulation shall be 1-inch thick, except where noted to be greater. Duct sections shall connect by mechanical means to maintain positive concentricity of liner with duct. All fittings and transitions shall have perforated inner liner (except where noted otherwise). Lining material shall comply with paragraph titled “Duct Lining” in this specification section. United McGill "Acousti-k27" (or approved).

2.4 FLEXIBLE DUCT

A. Type: Factory insulated fully lined flexible duct.

B. Construction: Double-ply neoprene coated polyester fabric hose, reinforced with a steel wire helix. Black color. Fire hazard rating not to exceed 25 for flame spread and 50 for smoke development, as tested by ASTM E84.

C. Thermal Characteristics: Certified thermal resistance “R” of 4.2 Hr-SF-deg F/Btu, rated in accordance with ADC-FLEX. Except where duct is installed in an unconditioned area (and where required by code) provide certified thermal resistance “R” of 8 Hr-SF-deg F/Btu, rated in accordance with ADC-FLEX.

D. Working Pressure: As required to suit maximum pressure to be encountered on system, but no less than 4-inch wc positive, 0.5-inch wc negative.

E. Length: Shall not exceed 8 feet where used on duct systems with a pressure class of 2-inches and less; maximum 5 feet length on higher pressure class systems.

F. Code Compliance: Comply with code and applicable standards; including NFPA 90A, NFPA 90. Shall be UL listed and labeled as a Class 1 connector per UL 181.

2.5 DUCT LINING

A. Material: Flexible, inorganic glass fiber material, bonded with thermosetting resin, maximum thermal conductivity of 0.24 Btu-inch/hr-sq. ft.-degree F at 75 degrees F, coated to prevent erosion, conforming to NAIMA-DLS and exceeding that standard as specified herein. Suitable for air temperatures to 250 degrees F, and duct velocities to 6000 feet per minute. Surface shall be coated with an acrylic coating having anti-microbial agents and factory applied edge coating. Johns-Manville “Permacote Linacoustic” (or approved).

B. Thickness: Lining shall be 1-inch thick except where noted otherwise.

C. Adhesives and Fasteners: Conform to NAIMA-DLS, as recommended by the duct liner manufacturer, and suitable for the application. Adhesive shall comply with ASTM C 916. Edge sealant shall use duct liner manufacturers approved adhesives or sealants (Hardcast “Seal Tack” or Durodyne “Dyn-O-Coat”).

D. Fungi and Bacteria Resistance: Conform to ASTM C 1338 and ASTM G21 for fungi resistance and ASTM G 22 for bacteria resistance.

PART 3 - EXECUTION

3.1 DUCTWORK INSTALLATION

A. General: Install all ductwork with all accessories and connections to provide complete and operable duct systems, in accordance with plans and specifications. See Section 20 05 29 for hangers and supports. Provide quality assurance review of all drawings prior to beginning work (see paragraph titled Quality Assurance, this specification Section and see Section 20 05 00). Provide duct and plenum sizes and locations as shown on the drawings; except as adjusted for field conditions and work of other trades, and with prior approval of the Engineer. See Section 20 05 00 for offsets and transitions to be included in project.

B. Coordination: The Contractor shall fully coordinate the work of all trades to avoid interferences and conflicts. Due to the extremely tight spaces in portions of the building, the Contractor shall coordinate duct reinforcement spacing and supports with other trades as necessary to avoid interferences. In addition, the Contractor shall select duct gauge and reinforcement types to avoid interferences. Changes required due to lack of coordination between trades, improper spacing or selection of hangers, or improper duct gauge and reinforcement selection, shall be done at no additional cost to the owner.

C. Field Measurements: Prior to fabricating any duct materials, the Contractor shall field measure all areas where ducts will be installed to verify room available and all offsets and fittings required. Field verify duct connection sizes and locations to equipment, louvers, and similar items.

D. Workmanship: All work shall comply with code, SMACNA-DCS, and other applicable standards. Ducts shall be installed level (unless noted otherwise) and in neat lines with the building construction using best professional practices.

E. Exposed Ducts: All ducts are to be installed concealed unless indicated otherwise. Ducts that are exposed shall be carefully fabricated, stored, and installed for best appearance. All dents, dings, scratches and other damage shall be repaired for a high quality finished look; all dirt, debris, labels, stickers, lettering, and marks removed; and the duct completely cleaned. Any sealant shall be cleaned to form a straight and even seam adjacent to joints, have no overlap onto duct areas not needing sealant, and have all excess sealant removed (mask off adjacent areas as necessary).

F. Flexible Duct: May only be used where specifically shown on the plans. Attach flexible duct inner core to sheet metal duct (or connector) with draw band. For insulated type, pull insulation and outer jacket completely over the inner core (at the connection to the sheet metal duct) with outer jacket covering the inner core and tucked back at its end to provide a continuous vapor barrier cover; install draw band to secure the outer jacket and insulation. Use metal type draw bands on duct systems where duct pressure class exceeds 3-inches or where temperature or other conditions do not allow the non-metal type and where indicated; use type of metal suitable for the conditions without corrosion or other deterioration. Install flexible duct with a centerline turning radius not less than one duct diameter. Where this turning radius cannot be maintained with the flexible duct use sheet metal elbows or (at air inlets/outlets) provide a plenum having a side connection.

G. Spin-in Fittings/ATTO's: May be used for branch ducts to individual outlets only. Apply a bead of duct sealant to all spin-in fittings where fitting seals against sheet metal duct.

H. Sealing:
   1. General: Use materials listed and approved for the specific application. Foil tape may only be used at duct connections to air inlets/outlets (unless specifically noted otherwise). Clean surfaces to be sealed of moisture and all contaminants. Seal joints in accordance with SMACNA-DCS, sealant manufacturer's instructions, and UL 181.
   2. Ductwork: Seal to meet duct leakage criteria as follows: Seal Class B; except on duct system with pressure class greater than 2" shall be Seal Class A.
   3. Flexible Duct: Coat connection of flexible duct to metal duct with duct sealant prior to installing the flexible duct.
   4. Air Inlets/Outlets: Seal duct connections (including "cans" or plenums) at air inlets and air outlets with duct sealant or foil tape; except at louvers and exposed ducts only sealant shall be used.
   5. Exterior Ductwork: Special attention and effort shall be applied to the sealing of exterior ductwork to prevent any entry of water. Sealant shall be applied to all seams and joints prior to assembly in order to provide a layer of sealant which is continuous through the joint or seam. Additional sealant shall then be applied to the exterior of the joint or seam to ensure a weathertight closure. Any leakage or damage from water leakage into duct or building shall be repaired at no additional cost to the Owner.

I. Ductmate: All "Ductmate" and similar systems shall be installed in strict accordance with manufacturer's instructions.

J. Protective Caps: Provide temporary sheetmetal caps or heavy visqueen covers over all open portions of ductwork to prevent debris, dirt, and dust from entering the ductwork. Such covers shall be installed at the end of each work shift, and shall remain in place until all work activities or events that may cause duct contamination will no longer occur.

3.2 PREPARATION FOR SERVICE

A. Cleaning: All ducts shall be wiped or blown clean of all dust and debris prior to the installation of grilles or diffusers. Notify the Engineer to allow for an inspection prior to installing grilles or diffusers.

B. Contaminated Ducts: Where ducts have been contaminated by dirt or debris during the construction process, the affected duct systems shall be cleaned by an independent firm specializing in the vacuum cleaning of ductwork. All costs associated with such cleaning shall be the responsibility of the Contractor.

END OF SECTION

SECTION 233300 – DUCT ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.

B. Requirements of Section 20 05 00 apply to this Section.

1.2 WORK INCLUDED

A. Manual Dampers.

B. Backdraft Dampers.

C. Flexible Connectors.

D. Duct Access Doors.

1.3 QUALITY ASSURANCE

A. General: Comply with Section 20 05 00.

B. Workmanship: Construction and installation of all duct accessories shall comply with applicable SMACNA-DCS, and exceed those standards as noted.

1.4 SUBMITTALS

A. General: Submittals shall comply with Section 20 05 00.

B. Product Data: Submit product information on all items to be used.

C. Sound Attenuators: Submit dynamic insertion loss and pressure drop data for all sound attenuators. Submit listing of all sound attenuators by unit served, airflow application, cfm, size, velocity, and pressure drop.

1.5 REFERENCES

A. AMCA 500D: Laboratory Methods for Testing Dampers for Rating.

B. SMACNA-DCS: SMACNA HVAC Duct Construction Standards, 3rd Edition.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Products shall comply with Section 20 05 00, Paragraph 2.1, Acceptable Manufacturers.

B. Manual Damper Hardware: Duro-Dyne, Young Regulator Co., Ventfabrics, Krueger, Rossi.

C. Backdraft Dampers: Air Balance, Ruskin, Greenheck.

D. Flexible Connections: Ventfabrics, Duro-Dyne Elgen.

E. Duct Access Doors: National Controlled Air, Ventfabrics, United-McGill, Kees, Ruskin, Vent Products, Duro-Dyne.

2.2 MANUAL DAMPERS

A. Type: Manually adjustable volume dampers.

B. Blades: Damper blades shall be fabricated of galvanized steel or stainless steel (unless a specific material is indicated), two gages heavier than duct in which installed, and in accordance with SMACNA-DCS. Maximum blade width 12 inches; fabricate multi-blade dampers with opposed blade pattern for ducts larger than 12" x 48".

C. Regulators: Damper regulator sets shall have quadrant dial regulator with locking nut, square end bearing one side, and spring round end bearing other side (small sizes) or open end square bearing (larger sizes), axis of blade the long dimension. Multiple blade dampers shall have individual quadrants for each blade or one quadrant with interconnected blades. Regulator sets shall be Duro-Dyne model numbers (or approved equal) as follows:

Max. Blade Dimension	Duro-Dyne Regulator Set	Shaft Size
10" and less	KS-145, 145L	1/4"
11" to 14"	KSR-195, 195L	3/8"
15" to 23"	SRS-388, SB-138, KP105	3/8"
24" and larger	SRS-128, SB-112, KP105	1/2"

D. Concealed Regulator: For remote damper adjustment with finished ceiling appearance. Shall consist of self-locking regulator of cast alloy construction (with serrated core, spring washer, housing, indicator, lock nut) cast into a cylindrical housing for flush ceiling installation. Housing cover shall be of steel construction, shall telescope into the regulator housing to be flush with the finished ceiling, and be secured to the housing with two screws. Provide with extension rods, linkages, miter gears, and all accessories as needed for proper damper operation. Plain Finish. Ventfabrics No. 666, 667 or Young Regulator Co. No. 301 (or approved equal).

E. Extractor Fittings: Galvanized steel construction, 24 gauge steel blades on 2 inch centers, with worm gear operator for adjustment through face of grille. Krueger EX-88 (or approved equal).

COUNTERBALANCED BACKDRAFT DAMPERS - LOW PRESSURE DROP

F. Type: Airflow and gravity operated backdraft dampers with adjustable counterbalance weight. Ruskin CBD6.

G. Frame: Shall be constructed of minimum 18 gauge galvanized steel or stainless steel or minimum 0.125-inch thick 6063T5 extruded aluminum (unless a specific material is indicated).

H. Blades: Shall be constructed of minimum 0.07-inch thick extruded aluminum, or formed stainless steel (unless a specific material is indicated), with extruded vinyl edge seals. Seals shall prevent any noise due to damper opening/closing. Bearings shall be synthetic polycarbonate or acetal or zytel type. Damper linkage shall be with aluminum or galvanized steel tiebar. Counterbalance weights shall be attached to blades, be of galvanized steel construction, and be adjustable.

I. Configuration: Horizontal or vertical airflow as indicated on plans.

J. Performance:
1. General: Dampers shall be tested in accordance with AMCA standards.
2. Temperature Rating: -40 to 200 degrees F.
3. Closed Position: Withstand maximum back pressure of 16 inches w.g.
4. Open Position: Withstand maximum air velocity of 2,500 feet per minute.
5. Operation of Blades: Start to open at 0.02 inch w.g.; fully open at 0.05 inch w.g.
6. Pressure Drop: Maximum 0.025 inch w.g. at 700 feeet per minute, maximum 0.15 inch w.g. at 1,500 feet per minute.
7. Dampers used to prevent the entry of outdoor air shall have air leakage no greater than 20 cfm/sf at 1-in w.g. where not less than 24-inches in any dimension, and no greater than 40 cfm/sf where less than 24 inches in any dimension; as tested in accordance with AMCA 500D.

K. Depth of Operation: Depth required to operate shall not exceed 10-inches.

2.3 FLEXIBLE CONNECTORS

A. Type: Flexible fabric type connectors, to provide vibration isolation at equipment duct connections and to allow for movement in duct systems.

B. Fabric:
1. Width: Minimum 3” wide except at equipment 3 hp or larger with external vibration isolators fabric shall be minimum 6” wide.
2. Indoor Applications: Flexible woven glass fiber fabric with neoprene coating, minimum 22 oz/sq. yard, 500 lbs x 450 lbs tensile strength. Suitable for temperatures from -40 to 200 deg F.
3. Outdoor Applications and Where Exposed to Chemicals: Flexible woven glass fiber fabric with hypalon coating, ozone resistant, 24 oz/sq. yard, 225 lbs x 300 lbs tensile strength. Suitable for temperatures from -40 to 250 deg F.
4. High Temperature Applications: Fiberglass/satin weave with Teflon coating; temperature rating of minimum 500 deg F and to suit application, 400 lbs x 300 lbs tensile strength.

C. Metal Collars: Minimum 24 gauge galvanized steel 3” wide metal edge connectors, each side of fabric, connected to fabric by folded over metal seam. Fabricate of same material as ducts connected to.

D. Fire/Smoke Rating: Flame spread rating not over 25, and smoke developed rating not higher than 50; complying with IMC requirements and NFPA standards.

2.4 DUCT ACCESS DOORS

A. Construction: Access doors shall be of double wall construction, made with minimum 24 gage galvanized steel, tight fitting, with sealing gasket, and cam locks (or may be hinged type with latches).

B. Size:
1. General: Access doors shall be of sufficient size so that items concealed in duct can be serviced and inspected, and shall be adequately sized to allow complete removal of the item being served (where removal cannot be made without disturbing fixed ductwork).
2. Minimum size: Doors shall be minimum 14" x 14". Where duct size will not accommodate this size door, the doors shall be made as large as practicable.
3. Large Sizes: Doors larger than 14" x 14" shall have a minimum of 4 cam locks (or where hinged type is used, have a minimum of two (2) latches).

C. Insulation: Doors in insulated ducts shall be insulated type, with minimum 1 inch thick fiberglass insulation.

D. Round Ducts: Access doors on round ducts shall use either lined rectangular tap off with rectangular access door or curved insulated access door (for insulated duct); or curved type un-insulated access door (for un-insulated duct).

PART 3 - EXECUTION

3.1 MANUAL DAMPERS

A. General: Dampers shall be fabricated and installed in accordance with SMACNA-DCS requirements for volume dampers.

B. Locations: Install dampers at locations shown on the drawings in branch ducts to all air inlets/outlets, and at all other locations as required by the Balancer to allow for the balancing of the system. Locate dampers at a point where the damper is most accessible; orient damper regulator for best access.

C. Non Accessible Dampers: Provide flush-mounted concealed type damper quadrants for ducts concealed in walls or non-removable ceilings and where a remote damper operator has been indicated.

D. Initial Setting: Set and lock all dampers in the full open position prior to balancing.

E. Extractor Fittings: Provide where indicated on the plans and at wall type inlets/outlets where such outlets cannot be served by a manual damper in the branch duct.

F. Identification: Provide orange surveyor's tape, approximately 18" long tied to each damper regulator (except not required on dampers in ducts exposed to view in finished areas).

3.2 BACKDRAFT DAMPERS

A. General: Install in accordance with manufacturer's instructions.

B. Application: Use counterbalanced type at all non-fan powered building exhausts and reliefs; all others shall be the standard type.

C. Adjustments: Adjust counterbalanced backdraft dampers to be open at 0.07" building pressure (unless noted otherwise), or as necessary for proper space pressurization and building air balance. Coordinate work and settings with air balancer.

D. Access Doors: Provide access doors to backdraft dampers, except that where damper is installed immediately behind a ceiling or wall grille, and is accessible by removing this grille, an access door is not required.

3.3 FLEXIBLE CONNECTORS

A. General: Provide flexible connectors at all duct connections to all equipment, where ducts of dissimilar metals are connected, and where shown on the drawings. Except that flexible connectors are not required on internally spring isolated fans where the fan is located in a separate mechanical room and a flexible connector has not been shown.

B. Round: For round ducts, the flexible material may be secured by zinc-coated, iron clinch type draw bands directly to adjoining duct; or with normal duct joining methods and using metal collars furnished with flexible connectors.

C. Slack: Install flexible connections with sufficient slack to permit 1 inch of horizontal or vertical movement of ducts or equipment at flexible connection point without stretching the flexible material. At building expansion joints install sufficient flexible material to allow for 2 inch movement in any direction; provide two flexible connectors separated by a 12 inch section of duct.

D. Outdoors: Where installed exposed to outside weather, provide a galvanized "hat" channel protecting top and vertical stretches of flexible connector from sunlight and weather.

3.4 DUCT ACCESS DOORS

A. General: Provide duct access doors at all automatic control dampers, fire dampers, fire/smoke dampers, smoke dampers, backdraft dampers, all duct coils, thermostats, filters, control devices, and any other components in the duct system that require service or inspection. Coordinate with Section 23 09 33 to confirm quantity and location of control devices.

B. Return and Exhaust Ducts: Provide access doors every 20 feet in return and exhaust air ductwork as required by NFPA 90.

C. Size and Location: Access doors shall be of sufficient size and so located so that the concealed items may be serviced and inspected or completely removed and replaced.

END OF SECTION

SECTION 233700– AIR OUTLETS AND INLETS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.

B. Requirements of Section 20 05 00 apply to this Section.

1.2 WORK INCLUDED

A. GRD Outlets.

B. GRD Inlets.

C. Roof Caps.

1.3 DEFINITIONS

A. GRD's: Grilles, Registers, and Diffusers.

1.4 REFERENCES

A. AHRI 885: Procedure for Estimating Occupied Space Sound Levels in the Application of Air Terminals and Air Outlets.

B. AMCA 500: Laboratory Methods of Testing Louvers for Rating.

C. ASHRAE 70: Method of Testing the Performance of Air Outlets and Air Inlets.

D. ASHRAE-F: ASHRAE Handbook of Fundamentals.

E. SMACNA-DCS: HVAC Duct Construction Standards, 3rd Edition.

1.5 SUBMITTALS

A. General: Comply with Sections 20 05 00 and 01 33 00.

B. Product Data: Submit product information for all items to be used.

C. Operation and Maintenance: Submit operation and maintenance data and submittal data for inclusion in project O&M Manuals.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Products shall comply with Section 20 05 00, Paragraph 2.1, Acceptable Manufacturers.

B. Grilles, Registers and Diffusers: Titus, MetalAire, Krueger, Price, Tuttle & Bailey, Kees, Carnes.

C. Wall and Roof Caps: Greenheck, PennBarry, Nutone, Carnes.

2.2 GENERAL REQUIREMENTS

A. Type: Air outlets and inlets shall be of the size, type, and with number of throws as shown on the drawings; and shall match the appearance and performance of the manufacturers' models specified and scheduled on the drawings.

B. Performance: Air outlet and outlet performance shall be based on tests conducted in accordance with ASHRAE 70.

C. Sound Level: Air outlets and inlets shall not exceed a sound level of NC 30 for the size indicated and airflow rate application. Sound levels shall be determined in accordance with AHRI 885 and ASHRAE-F.

D. Finish: Grilles, Registers and Diffusers shall have factory applied finish, color as selected by Architect/Engineer, except where indicated to have a brushed aluminum finish (or other finish type). Finish shall be an anodic acrylic paint, baked on, with a pencil hardness HB to H. Pint shall pass a 90 hour ASTM B117 salt spray test, 250 hour ASTM D870 water immersion test, and an ASTM D2794 reverse impact test with at least a 50 inch-pound force applied.

E. Frame Style: Provide air outlets and inlets with frame style to match ceiling or wall construction installed in. Where supply air outlets or inlets are installed in T-bar ceiling systems, they shall be factory installed in 2' x 2' or 2' x 4' metal panel to match ceiling layout. Where installed against gypsum board surface, brick or similar hard surface, or where exposed, provide with 1-1/4-inch wide outer border. Where space does not permit installing 2' x 2' metal panel, provide outlets or inlets with 1-1/4-inch wide outer border. Where air outlets are installed adjacent to surface mounted light fixtures, outlets shall have 4-inch deep drop frames. (See reflected ceiling plan and/or electrical lighting plan for ceiling and lighting types).

F. Construction: Air outlets and inlets shall be of steel or aluminum construction except that:
   1. Where noted to be constructed of a specific material, shall be as noted.
   2. In assemblies with a required fire rating and required to have fire dampers shall be of steel construction.
   3. In wet areas or subject to condensation (i.e., locker rooms, restrooms, kitchens, exterior soffits, etc.), where not used in fire rated assemblies, shall be of aluminum construction.
   4. Air outlets and inlets in the same room, area, or within common view shall be constructed of the same material.

2.3 SUPPLY AIR OUTLETS

A. Ceiling Supply Grille (CSG): Aluminum or steel construction, have louver face, for horizontal discharge. Louver face shall be fixed with pattern to match schedule. Kees Architectural Stamped Grilles (or approved equal).

2.4 RETURN AIR INLETS

A. Ceiling Return Grille (CRG): Same as CD.

2.5 EXHAUST AIR INLETS

A. Ceiling Exhaust Grille (CEG): Same as CD.

2.6 ROOF CAPS

A. Sloped Roofs: Low profile rectangular roof cap, steel construction, with flashing base flange, downward facing outlet, outlet bird screen and spring loaded integral backdraft damper. Steel shall have an electrically bonded black finish or be of galvanized steel construction with black enamel finish. Throat area no less than the connecting duct free area. Flashing flange shall be minimum three inches larger all around than hood portion or as required by roofer to properly flash into roof; coordinate with Roofing Contractor and provide base flashing size as required. Greenheck RJ Series custom modified with larger base (or approved equal).

B. Dampers:
   1. General: Provide all roof caps handling exhaust air with motorized dampers; provide all relief roof vents with motorized dampers and backdraft dampers. Backdraft dampers shall be the counter balanced type (unless noted otherwise). Size shall match roof cap connecting duct size (unless noted otherwise) and be for installation in the duct connecting to the roof cap.
   2. Gravity Type: Shall be of aluminum construction with neoprene or felt lined edges, interconnected with linkage.
   3. Counter-balanced Type: Shall be as specified in Section 23 33 00.
   4. Motorized Type: Shall be as specified in Section 23 33 00. Actuator shall be provided by Section 23 09 33; where used as relief shall have modulating control.

2.7 MISCELLANEOUS

A. Goosenecks: Shall be made of minimum 18 gauge galvanized steel, in accordance with SMACNA-DCS, and as shown on the drawings.

B. Screen: 1/2-inch mesh, constructed of either 0.051-inch aluminum wire or 19 gauge galvanized steel wire.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install air outlets and inlets in locations indicated and so as to conform with building features and coordinated with other work. See hangers and supports specification Section for supports and additional requirements.

B. Location Verification: Verify all air inlet/outlet locations with building features and other trades prior to installing any duct systems that will connect to the air outlets/inlets. For locations where air inlet/outlet location is noted to be verified, or location is not clear, develop shop drawings showing the proposed location, or the location that best suits field conditions, and submit for review.

C. Connections: Furnish all necessary screws, clips, duct collars, and transitions required to allow for the installation and connection of ductwork to all air outlets/inlets and for the attachment of air inlets/outlets to the building and to supports. Connect all ductwork to air inlets and outlets with fasteners, minimum one each side and in compliance with SMACNA-DCS. See ductwork specification Section for sealing and additional requirements.

D. Dampers: Install in accordance with manufacturer instructions. Check for free movement of dampers and proper control by damper actuator. See Section 23 09 33 for control of motorized dampers.

E. Painting:
   1. Paint ductwork and accessories which are visible behind air outlets and inlets flat black. Painting to include ductwork, duct liner, turning vanes, liner attachments, and all visible items (including fastening pins for duct lining).
   2. Coordinate with the Division 09 Contractor for any necessary painting of air outlets/inlets/louvers prior to installation.

F. Weather Exposure: All outlets and inlets exposed to the weather shall be adequately flashed and installed in a manner to assure complete weatherproofness.

G. Screened Openings: Provide screened openings (SO) on all duct openings where indicated and where openings do not have grilles or registers.

END OF SECTION

SECTION 237223 – ENERGY RECOVERY VENTILATOR

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.

B. Requirements of Section 20 05 00 apply to this Section.

1.2 WORK INCLUDED

A. Energy Recovery Ventilators.

B. Start-Up.

1.3 SUBMITTALS

A. General: Submittals shall comply with Section 20 05 00.

B. Product Data: Submit product information on unit including fan curves, coil performance, unit construction details, wiring diagram, data showing energy recovery, filter data, and weight.

C. Shop Drawing: Submit drawings of unit showing all dimensions, locations of unit components, and point of connection of all utilities.

D. Operation and Maintenance: Submit Operation and Maintenance data and submittal data for inclusion in project O&M Manuals.

1.4 GENERAL REQUIREMENTS

A. Standardization: All units of the same type shall be the product of the same manufacturer.

B. Substituted Equipment: The drawings show design configuration based on a particular manufacturer's equipment (i.e. basis of design). Use of another manufacturer's equipment (i.e. substituted equipment) that is configured different from what is shown will require redesign of mechanical ductwork, piping, electrical, structural, unit support systems, and general building construction to accommodate the substituted equipment. Such redesign shall meet the requirements and have the approval of the Architect/Engineer prior to fabrication. Contractor shall submit complete shop drawings showing all alternate unit installation plans and details; shop drawings shall comply with Section 20 05 00. The redesign shall be equal or superior in all respects to the Architect/Engineer's design (as judged by the Architect/Engineer), including such aspects as equipment access, ease of maintenance, duct connection locations, unit

electrical requirements, noise considerations, vibration unit performance, and similar concerns. Cost of redesign and all additional costs incurred to accommodate the substitutional equipment shall be borne by the contractor. Contractor is cautioned that certain aspects of the equipment cannot be fully evaluated until items are installed and operational, and all added costs after installation to make units equal to the basis of design shall be by the Contractor.

1.5 REFERENCES

A. AMCA 230: Laboratory Methods of Testing Air Circulating Fans for Rating and Certification.

B. AHRI 1060: Standard for Performance Rating of Air-to-Air Exchangers for Energy Recovery Ventilation Equipment.

1.6 WARRANTY

A. General: See Division 00 and Section 20 05 00 for basic warranty requirements.

B. Extended Warranty: The ERV core shall be warranted to be free of manufacturing defects and to retain its functional characteristics, under circumstances or normal use, for a period of ten years from the date of purchase. The balance-of-unit shall be warranted to be free of manufacturing defects and to retain its functional characteristics, under circumstances of normal use, for a period of two years from the date of installation.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Products shall comply with Section 20 05 00, Paragraph 2.1, Acceptable Manufacturers.

B. Energy Recovery Ventilator: Trane-Mitsubishi, RenewAire.

2.2 GENERAL

A. Guards: Exposed openings into fan housings shall be protected with substantial metal screens or gratings. Electrical components with shock potential shall be physically protected and labeled (label as to hazard and items being accessed).

B. Fan Balancing: The shaft and fan wheel(s) shall be factory statically and dynamically balanced.

C. Motors: Shall be UL listed and comply with Section 20 05 00. Motor efficiency shall comply with Code. Motors shall have integral thermal protection with automatic reset.

D. Outlets and Inlets: Equipment shall be furnished with attachment angles and/or flanges to allow for attaching external ductwork.

E. Fan Performance: Shall be based on laboratory tests conducted in accordance with AMCA 230. Fan capacity shall not be less than the values scheduled on the drawings and shall be constructed to be able to operate with total pressures 20% higher than that indicated.

F. Controls: Coordinate with Division 25 Contractor for required interfaces between air handling equipment and building control system.

G. Gasketing: Where units are furnished in sections, unit manufacturer shall furnish unit with gasketing to allow sealing of adjoining sections.

H. Sound Tests: Shall be done by fan manufacturer in an AMCA certified sound testing laboratory. Sound tests shall be conducted in accordance with AMCA 300. Provide necessary testing and calculations to develop required sound data. Tested sound power levels shall not exceed specified levels by more than 3 dB in any octave band.

I. Factory Tests: Every unit shall be factory tested prior to shipping. Tests shall include (as a minimum): Motor dielectric voltage-withstand test, unit dielectric voltage-withstand test, continuity of internal control circuits test, unit amperage test, proper fan operation.

2.3 ENERGY RECOVERY VENTILATOR

A. Type: Energy recovery ventilator using fixed plate enthalpy heat exchanger.

B. General:
1. Unit shall be complete single package, self contained factory assembled unit, requiring only electrical, duct, and control connections to operate.
2. Capacity: Shall be as scheduled at the conditions noted.
3. Unit configuration shall be as shown on plans.

C. Cabinet:
1. General: Constructed of minimum 20 gauge G-90 galvanized steel, reinforced and constructed for maximum anticipated static pressures involved, but no less than 4" w.c. with cabinet leakage less than 1% of scheduled airflow.
2. Liner: Interior of cabinet shall be insulated with minimum 1-inch thick, 4 pound per cubic foot density foil scrim faced fiberglass insulation to provide a cleanable surface. Double-wall construction with foam injected insulation and interior 20 gauge G-90 galvanized steel is also acceptable.
3. Access Doors: Constructed same as cabinet, size to access unit internals, with full perimeter gasket. Doors shall be opened by releasing multiple latches or similar method requiring no tools.

D. Fan(s): Integral supply and exhaust fans, direct drive, steel or aluminum construction, multi-blade centrifugal type. Motors shall be ECM type.

E. Energy Recovery Core:
1. General: Total enthalpy type, capable of transferring both sensible and latent energy between airstreams. Latent energy transfer shall be accomplished by direct water vapor transfer from one airstream to the other, without exposing transfer media in succeeding

cycles directly to the exhaust air and then to the fresh air. No condensate drains shall be required.

2. Certifications: The energy recovery cores used in these products shall be third party Certified by AHRI 1060 for Energy Recovery Ventilators. AHRI published certifications shall confirm manufacturer's published performance for airflow, static pressure, temperature and total effectiveness, outdoor air (OACF) and exhaust air leakage (EATR). OACF shall be no more than 1.02 and EATR shall be a 0% against balanced airflow.

F. Filters: Unit shall be provided with filter racks for accommodating 2" thick filters (unless noted otherwise), with minimum filter area (or sizes) as scheduled. Access to filters shall be through unit access doors.

G. Electrical:

1. General: Unit shall be for use with single point electrical power connection unless indicated otherwise on the electrical drawings. Unit shall be furnished with all necessary wiring, raceway, transformers, contactors, relays, motor starters, and accessories with power and controls connected to all unit devices for proper unit operation and with the specified sequence. Electrical shall comply with NEC and local code requirements. Access panels to unit electrical components shall be hinged with latches (or equivalent device), requiring no tools to open.
2. Disconnects: Unit shall have a main fused power disconnect. Disconnects shall comply with NEC, and be accessible from outside unit enclosure.
3. Motor Starters: Each fan shall be provided with a motor starter (unless a VFD is indicated), with overcurrent protection complying with NEC requirements, hand-off-auto switch, and disconnect.
4. Wiring: Wiring shall be color coded and labeled to indicate termination points. Wiring diagram shall be posted in unit interior compartment.

H. Controls: Unit control shall be by Section 23 09 33 (unless otherwise noted); unit shall have factory controls to provide necessary safeties and to allow for control by Section 23 09 33. Section 23 09 33 shall enable unit fans when unit "run" terminals are connected. Unit shall be furnished with all necessary relays, starters, wiring terminal strips, timers, safety devices, etc. to allow for the sequence of operation as specified in Section 23 09 33 using the Section 23 09 33 control system. Unit control wiring shall be color coded and numbered corresponding to unit's wiring diagram. Access panels to unit controls shall be hinged with latches (or equivalent device), requiring no tools to open.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install the units as shown on the drawings, in accordance with manufacturer's instructions, Code, and best construction practices.

B. Locations: Install at locations indicated, to allow for maintenance access and proper clearances.

C. Duct Connections: Provide flexible connections in ductwork connections to units.

3.2 START-UP

A. Initial Checks: Prior to operating units, checks shall be made to insure that adequate voltage, duct connections, electrical connections, control connections, and other items as listed by the manufacturer are properly provided/connected and ready to ensure safe and proper unit operation.

B. Testing and Adjustment: Operate unit to test for proper operation, including fan rotation, and correct interface to other controls.

END OF SECTION

SECTION 238144 – AIR-SOURCE SPLIT HEAT PUMPS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.

B. Requirements of Section 20 05 00 apply to this Section.

1.2 WORK INCLUDED

A. Split System Air Source Heat Pumps.

B. Refrigerant Piping and Accessories.

1.3 SUBMITTALS

A. Product Data: Submit complete product information on all units; include performance data showing cooling and heating capacity (as a function of indoor and outdoor coil db/wb temperatures and indoor coil air flow rates), supplementary heater capacity, fan performance, filter information, unit accessories, wiring diagram, and point of connection of all utilities.

B. Installation: Submit manufacturers installation instructions for units.

1.4 QUALITY ASSURANCE

A. Listing: Units shall be UL listed and labeled.

B. Ratings: Units cooling and heating performance shall be rated in accordance with ANSI/AHRI 210/240.

C. Codes: Unit and accessories shall conform to applicable codes and standards. Unit efficiency shall comply with code (and exceed code as indicated).

D. Operating Ability: Outdoor unit and all components shall be able to withstand ambient temperatures from 0 deg F to 125 deg F, plus direct exposure to sun and weather elements without adverse affects. Unit shall be able to operate and produce cooled air between ambient temperatures of 45 deg F and 115 deg F. Unit shall be able to operate and produce heated air between ambient conditions of 0 deg F and 80 deg F. Unit shall be able to operate with supply air temperatures between 50 deg F and 125 deg F; and with room temperature setpoints between 65 deg F to 85 deg F.

E. Electrical: Coordinate equipment electrical voltage/phase, minimum circuit amps, and overcurrent protection requirements with the Division 26 contractor prior to ordering.

1.5 GENERAL REQUIREMENTS

A. Refrigerant Pipe Sizing: Refrigerant pipe sizes shown on the drawings are preliminary only. Due to the use of proprietary selection criteria by equipment manufacturers verify and finalize all required pipe sizes with the equipment manufacturer (or manufacturer's representative) prior to bidding. Verify with the equipment manufacturer (or manufacturer's representative) the need for any accumulators, solenoid valves, and similar accessories and size/select such devices prior to bidding. Include costs in bid for required pipe sizes and all accessories.

B. Extended Warranties: Unit compressors shall be warranted by the manufacturer for five years. All labor and materials associated with compressor replacement (or repair) shall be warranted.

C. Spare Parts: Provide two spare sets of filters for each unit (in addition to filters installed in units).

1.6 REFERENCES

A. ANSI/AHRI 210/240: Performance Rating of Unitary Air Conditioning & Air-Source Heat Pump Equipment.

B. ANSI/AHRI 270: Sound Rating of Outdoor Unitary Equipment.

C. ANSI/ASHRAE 52.2: Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size.

D. ASME B16.22: Standard for Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.

E. ASME B16.26: Standard for Cast Copper Alloy Fittings for Flared Copper Tubes.

F. ASTM B280: Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Products shall comply with Section 20 05 00, See Section 20 05 00, paragraph 2.1 for Acceptable Manufacturer requirements.

B. Heat Pumps: Trane, Samsung, Carrier, York/JCI,

C. Condensate Safety Switch: Little Giant, Diversitech, Rectorseal.

D. Refrigerant Piping and Accessories: Mueller, Sporlan, Nibco, Elkhart, Parker, Emerson, Henry.

2.2 SPLIT SYSTEM HEAT PUMP - OUTDOOR UNIT

A. Type: Split system air-to-air heat pump; outdoor section.

B. Capacity: Units shall have minimum cooling and heating capacities as scheduled on the drawings at the conditions shown and with the indoor unit (i.e., air handler) indicated; and shall be rated in accordance with AHRI standards.

C. General: Unit shall be fully factory assembled and shall be complete with casing, coils, fans, compressor(s), piping, wiring, controls, and all other accessories required to be ready for field connections and operation.

D. Factory Test: Units shall be factory run-tested to verify proper heating, cooling, defrost, control, and fan operation.

E. Refrigerant: Units shall be for use with refrigerant R-410A and shall be fully charged at the factory.

F. Unit Casing: Shall be constructed of minimum 18 gauge zinc coated steel, with zinc phosphate coating and baked-on polyester powder coating. Access panels shall provide access to unit controls and all major components. All screws or holding devices shall be of cadmium plated construction to resist corrosion. Unit shall have knockouts for piping, electrical and control connections with rubber grommets to insure water-proof connections.

G. Compressor(s): Hermetically sealed or serviceable hermetic reciprocating type compressor, specifically designed for heat pump service. Compressor shall have internal line break overcurrent and overtemperature protection, low pressure protection (via low pressure switch), high pressure protection (via internal relief valve or pressure switch), and crankcase heaters. Motor shall be suction gas cooled and have a voltage utilization range of plus or minus 10% of nameplate voltage. Compressor(s) shall have internal spring isolation mounting and discharge gas sound muffler to reduce vibration transmission and noise.

H. Refrigerant Circuit: Shall be fully factory piped and shall include a refrigerant line filter/drier, liquid line and gas line service valves (brass, back seating type) with service ports, reversing valve, accumulator, and thermostatic expansion valve for both heating and cooling operation.

I. Coils: Shall be constructed of seamless copper tubing with aluminum fins mechanically bonded to tubes.

J. Fan(s): Shall be statically and dynamically balanced at factory. Shall be propeller type, used in draw-through configuration, direct drive type, with permanently lubricated, totally enclosed weather-proof ball bearing type motor(s) having built-in overload protection.

K. Defrost: Unit shall have defrost cycle to remove build-up of frost on outdoor coil. Defrost cycle shall be an on-demand time and temperature initiated; i.e., after 90 minutes (adjustable to lower time periods) elapsed run time; if temperature is low enough, defrost cycle shall be activated. Defrost cycle shall be time or temperature terminated; i.e., defrost cycle shall stop after 10 minutes or when refrigerant temperature is high enough indicating defrost is completed. When in defrost mode, unit shall provide an output (normally open dry contacts) to building control system to allow Section 23 09 33 controls to activate supplementary electric heaters as needed. Unit shall also have defrost control in case of low evaporator coil temperatures at the indoor coil; unit shall prevent compressor slugging by temporarily interrupting compressor operation.

L. Hyper heat Pan Heater: Unit shall be factory furnished with electric drain pan heater for continuous operation in heating or defrost mode.

M. Electrical Power: Units shall be for use with power of voltage and phase as scheduled on the drawings.

N. Accessories:
1. Anti-Short-Cycle-Timer: Solid state 24 volt timing device to prevent rapid on-off compressor cycling; providing an approximate 5 minute delay between compressor starts.
2. Low Ambient Accessories: Provide unit with accessories as needed to allow operation to temperatures specified in Paragraph C above. Accessories shall include head pressure control device(s), evaporator freeze thermostat, low ambient isolation relay.
3. Compressor Start Assist: Provide capacitor(s) and relay(s) to allow improved compressor starts.

2.3 SPLIT SYSTEM HEAT PUMP - INDOOR UNIT

A. Type: Split system heat pump, indoor section (i.e. air handler). Air flow configuration as indicated on drawings.

B. Capacity: Units shall have minimum cooling and heating capacities as scheduled at the conditions shown and with the outdoor unit indicated, and shall be rated in accordance with AHRI standards.

C. General: Units shall be fully factory assembled and shall be complete with casing, coils, fans, piping, wiring, controls, supplementary electrical heaters and all other accessories required to be ready for field connections and operation. Unit shall be compatible with outdoor section as specified so as to provide performance over the temperature range indicated.

D. Refrigerant Circuit: Shall be fully factory piped and shall include factory installed thermostatic expansion valve (or dual flow metering device) to allow for both heating and cooling operation.

E. Unit Casing: Shall be constructed of zinc coated steel, with baked-on enamel finish. Access panels shall provide access to unit controls, indoor coil, supply air fan, and filters. Unit shall be completely insulated with minimum 1" thick 1-1/2 lb. per cubic foot neoprene coated fiberglass insulation. Condensate drain pan shall be provided with external connections on either side of unit.

F. Refrigerant Circuit: Shall be fully factory piped and shall include factory installed thermostatic expansion valve (or dual flow metering device) to allow for both heating and cooling operation.

G. Coils: Shall be constructed of seamless copper tubing with aluminum fins mechanically bonded to tubes.

H. Fans: Shall be statically and dynamically balanced at factory. Shall be double width, double inlet, forward curved centrifugal type, multi-speed direct drive type.

I. Direct drive fans shall have minimum of three speeds, field changeable by switching wiring connections at unit terminal strip or by operation of switches or equivalent method. Belt drive

units shall have adjustable sheaves. Fan and motor bearings shall be permanently lubricated type with built-in overload protection.

J. Air Filters:
1. General: Unit shall be provided with filter racks for accommodating filter sizes as scheduled on the plans (except where filters are indicated to be installed at another location).
2. Filter Type: Shall be pleated panel, disposable type, with thickness and minimum size as scheduled. Filter shall have MERV 8 efficiency as evaluated by ASHRAE 52.2.

K. Defrost: In conjunction with outdoor unit, unit shall have defrost control to prevent compressor slugging by temporarily interrupting compressor operation in case of low evaporator coil temperatures.

L. Electrical Power: Units shall be for use with power of voltage and phase as scheduled on the drawings. Units shall have single power entry unless indicated otherwise. Units with single source power entry shall require only one field connection and power source. All necessary terminal block, fuse blocks, fuses, wiring, junction boxes and accessories shall be factory installed within the unit cabinet to provide power to all devices (including the supplementary heater for single source power entry units).

M. Vibration Isolators: Neoprene-in-shear (or spring suspension) type. All isolators shall be sized by manufacturer for unit weights and so as to provide 95% vibration isolation efficiency.

N. Condensate Safety Switch: Code compliant safety switch for stopping unit operation at high condensate level. PVC or polymer body, with corrosion resistant mechanical float or reed switch, normally closed contacts, minimum 2.5 amp capacity at 24 vac, and 6 feet 18 gauge wire leads Little Giant ACS-5 (or approved equal).

2.4 REFRIGERANT PIPING AND ACCESSORIES

A. Piping: Hard drawn ACR copper tubing per ASTM B280, Type L, with silver brazed joints and wrought copper fittings per ASME B16.22. Use only long radius elbows. Flared fittings (at equipment connections only) shall comply with ASME B16.26. Soft copper tubing may only be used on runs less than 50-feet or where necessary (i.e. when routing through sleeves, or similar poor access areas).

B. Sight Glass: Sight glass shall allow visual inspection of refrigerant flow and indicate refrigerant moisture content. Shall be double port type, solder end connections, for use with type of refrigerant of system being installed in, same size as tubing installed in. Henry type 3103 or equal.

C. Isolation Valves: Brass ball valve, full port, rated for 700 psig and -40 deg F to 300 deg F. Compatible with refrigerant used with, UL listed, with rupture proof encapsulated stem, extended copper connections for ease in brazing. Provide in configuration (i.e. angle, straight, with access port) as required to suit application.

D. Filter/Drier: Sealed cannister type, with molded blended desiccant core, for filtering refrigerant system moisture, debris and acids. Suitable for refrigerant and system type used with. Size for maximum 1 psi pressure drop. Sporlan "Catch-All" (or approved).

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Comply with Section 20 05 00. Install in accordance with Manufacturer's written instructions, code, applicable standards and best construction practices. Indoor Units shall be level (or slightly sloped) to drain and aligned with building walls. All indoor units shall be hung from the building structure (unless noted otherwise). Provide custom fabricated steel support frames as necessary.

B. Location Verification: Install equipment in locations as indicated in accordance with the Contract Documents. Prior to selecting installation locations, confirm that: unit location matches ductwork for the area the unit is intended to serve; installed duct locations match unit; manufacturer's pre-installation checks have been completed; proper unit clearances and access will be provided; no adverse conditions will affect unit operation at the proposed location and arrangement present; and installation has been coordinated with other trades.

C. Complete Connections: Connect and install all items shipped loose with units; provide and connect all utilities and accessories as required for proper unit operation.

D. Refrigerant Piping: Shall be silver brazed. Bleed dry nitrogen through piping during brazing to minimize oxidation. Keep all open ends of piping capped when not being worked. Soft copper shall have long radius bends; install without kinks or excess bends. Piping shall be routed concealed, except where routed outdoors and where noted. Piping shall be ran plumb and square to building walls, and in a neat professional manner. Provide sight glass in refrigerant liquid piping at outdoor unit.

E. Refrigerant Valves: Provide isolation valves on refrigerant piping connections at the outdoor unit (unless unit has integral service valves). Provide valve with access port on larger volume systems to aid in system vacuum testing (or as required for other purposes).

F. Refrigerant Charge: Units shall be checked for proper refrigerant charge and oil level and charged to proper levels after all leak testing and evacuation work has been completed. Refrigerant to be added to the system shall be delivered to the site in factory charged containers and charged into the system through a filter/drier.

G. Cleaning: Units shall be thoroughly cleaned (internally and externally) of all debris prior to operation. Units shall be clean and in new condition prior to Owner acceptance.

H. Operation and Maintenance:
   1. General: Operation and Maintenance shall be in accordance with manufacturer's written procedures and recognized best maintenance practices. Keep records of maintenance and (upon request) forward to the Architect/Engineer prior to project final acceptance.
   2. Stored Products: Provide maintenance (i.e. equipment rotation, lubrication, flush, cleaning, etc.) and inspection on products while stored to maintain new condition.
   3. Installed Products: Provide maintenance and inspection of products and operate mechanical systems until substantial completion or specified Owner Instruction has been provided (whichever is later). Maintenance shall include all manufacturer's recommended maintenance (i.e. strainer cleaning, filter changes, bearing lubrication, belt tensioning, etc.). In addition to scheduled maintenance, review all equipment periodically to allow

detection of improper operation or any special maintenance needs; review shall be consistent with best practices for the product but in no case less than every two weeks.

4. Units shall not be operated until all construction activities that generate dust, dirt, fumes, or odors are complete. Units shall not be placed into service until start-up has been completed.

I. Owner Instruction: Instruct Owner on equipment operation, including: system start-up, shut-down, emergency shut-down, normal control operation, safety aspects, maintenance and repair instructions.

3.2 REFRIGERANT LEAK TESTING AND EVACUATION

A. Notification/Witnessing: Prior to beginning any testing, notify the Architect/Engineer when the testing will occur. The Architect/Engineer will witness (at his discretion) various parts of the test. Failure to notify the Architect/Engineer will be cause to re-test all piping in the presence of a representative of the Architect/Engineer.

B. Test Preparation: Disconnect and isolate from the system any components that may be damaged by the test pressure.

C. Testing: Connect oil-pumped, dry nitrogen to the system through a pressure reducing gauge manifold. Charge enough nitrogen into the system to raise the pressure to 50 psig. Let stand for 2 hours and check for signs of leakage. If no leakage is noted, slowly increase pressure to 300 psig (or as required by local code, whichever is higher). Tap all brazed connections with a rubber or rawhide mallet sufficiently hard to start any leak that might subsequently open from thermal expansion/contraction or vibration. Check the manifold gauge for any drop in pressure. Let the system stand pressurized for 24 hours. Re-check the manifold gauge. If no change in pressure is noted (after adjusting for temperature) the system may be considered free of leaks.

D. Leak Repair: If leakage is suspected or apparent, check joints with a glycerin soap solution or other means to locate the leaks. Repair any leaks found by completely disassembling the connection, cleaning the fitting and remaking the connection. Re-test the system after repairs are made both with pressure (300 psi for 24 hours) and at the leak location with a glycerin soap solution or other means of determining leaks.

E. System Evacuation: When the system has been proven free of leaks with the above methods, the system shall be completely evacuated of all air and moisture. Connect a vacuum pump to the system and pump the system down to 500 microns and let stand for a minimum of 2 hours. If the vacuum reading remains unchanged, the system may be charged with refrigerant.

F. System Charging: After satisfactory pressure testing and vacuum evacuation, fully charge the system with refrigerant. Any final connections that were not subject to the full test pressure (e.g. connections at unit, etc.) shall be carefully checked with a halide or electronic leak detector after the system has been charged.

3.3 START-UP

A. Pre Start-Up Inspection: Inspect equipment and connecting systems to confirm equipment and connecting systems to confirm equipment has been installed properly and is ready for start-up.

As a minimum, check for: proper voltage and phases, correct system refrigerant charge, correct electrical connections, complete control connections, all unit safety devices properly set and connected, heaters operational, fans free to rotate and rotating correctly, fans lubricated, belts tightened to proper tension, coils clear of obstructions, and other items as listed by the manufacturer are properly provided/connected and operating to ensure safe and proper start-up.

B. Start-Up: Perform start-up in accordance with manufacturers written start-up procedures. Arrange other trades needed to be present (i.e. balancer, control technician, etc.). Operate equipment in various modes to confirm proper operation. Observe proper operation of all unit components (heating, cooling, condenser fan, economizer, etc.).

C. Adjustments: Adjust and set unit components to allow for proper operation (i.e. adjust fan sheaves, adjust fan speeds, unit settings, etc.). Observe unit to detect any unusual vibration, leakage, loose wiring, or other situations that could affect unit operation.

END OF SECTION

SECTION 238246 – ELECTRIC HEATERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.

B. Requirements of Section 20 05 00 apply to this Section.

1.2 WORK INCLUDED

A. Electric Heaters.

1.3 SUBMITTALS

A. General: Comply with Section 20 05 00.

B. Product Data: Submit product information on all items.

1.4 GENERAL REQUIREMENTS

A. Listing: All heaters shall be listed by an independent testing laboratory for the application indicated.

B. Installation Verification: Prior to ordering units confirm finishes at heater location and type of installation and associated trim required; i.e. fully recessed, semi recessed, surface mount, etc.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Products: Shall comply with Section 20 05 00 Part 2.1 - Acceptable Manufacturers.

B. Ceiling Heaters: Q-Mark, Chromalox, Berko, Markel.

C. Duct Heaters: Indeeco, Markel, Q-Mark, Warren.

2.2 CEILING ELECTRIC HEATERS

A. Type: Heavy duty ceiling mounted electric forced air heater. Markel 3000/3380 series (or approved).

B. Construction: Exposed sheet metal shall be constructed of coated steel, with extruded louvered front, for surface, recessed, or suspended (T-bar) ceiling installation as shown on the drawings. Provide with mounting kits and trim to suit ceiling type being installed with. Unit shall have a powder coated finish on steel, white color.

C. Heating Elements: Unit shall have two or three heavy-duty, totally enclosed, corrosion resistant, steel sheathed elements, mechanically bonded to common corrosion resistant fins.

D. Motor and Fan: Motor shall be shaded pole, heavy duty, total enclosed, permanently lubricated type.

E. Electrical and Controls: Unit shall have thermal cut-out reset and integral thermostat (UNO). Thermostat shall be heavy duty snap action type. Provide with 24 volt contactor for remote pilot duty control of heater (i.e. night-setback control); where indicated to have night setback sequence. Provide with integral disconnect switch per NEC requirements.

F. Warranty: Entire heater shall be warranted for 5 years.

G. With reset thermal overheat protector.

H. Unit shall be of tamper-resistant construction with integral thermostat and fan.

I. Unit shall have powder coated finish.

J. Unit shall have a power control relay to allow for remote interrupting of the heater for night set-back.

K. Unit shall be provided with mounting accessories for installation as shown on drawings.

2.3 DUCT ELECTRIC HEATERS

A. Type: Open coil type electric duct heaters; of size and capacity as shown on the drawings.

B. Listing: Heaters shall be UL listed for zero clearance to combustibles, and shall be built to meet all requirements of the National Electric Code and NFPA.

C. Construction: Heating coils shall be made of 80% nickel and 20% chromium coiled resistance wire. Coils shall be supported in an aluminized steel frame and insulated by floating ceramic bushings. Heaters shall be of the configuration to suit the application as shown on the drawings.

D. Overtemperature Protection: All heaters shall be equipped with primary and secondary overtemperature safety devices. The primary safety device shall be a disc or liquid filled bulb type with automatic reset; the secondary device shall be a disc type with manual reset, wired in series with each heater stage, set to trip at a higher temperature than the primary safety device.

E. Overcurrent Protection: Fuses shall be provided for overcurrent protection; fuse capacities shall be rated for at least 125% of the circuit amperage.

F. Proof of Air Flow: For non-DDC control systems provide heater with differential air pressure device and sensing tube (or sail flow switch), interlocked with the heater to prevent heater

operation in case of insufficient airflow across the coil. Differential air pressure device (or sail flow switch) shall have sufficient sensitivity to suit velocity and duct pressures of the application. Configure and arrange differential air pressure device (or sail flow switch) for proper operation as the application requires. Air differential air pressure device shall have a pitot tube on high pressure side installed to sense duct total air pressure; except where heater is used on the suction side of a fan, the air differential air pressure device shall be connected to the low pressure side and be configured sensor to measure static pressure only. Where sensitive enough differential air pressure devices (or sail flow switches) are not available, provide heater with 24 volt relay for interlocking to a fan proof device (i.e. motor starter auxiliary contacts, fan start relay, or equivalent).

G. Terminal Box: All heater controls shall be mounted in a side mounted terminal box, unless a separate remote mounted terminal box is shown on the drawings. Terminal box shall be insulated from the heater casing.

H. Disconnect: Heaters shall be provided with a built-in power disconnect switch, having a terminal door interlock.

I. Controls: Heaters shall be furnished with 24 volt transformer and shall be for use with 24 volt controls unless indicated otherwise. Transformer shall have secondary fusing, and transformers which are not class 2 shall have primary fusing. Mercury control contactors shall be used for controlling heater stages unless indicated otherwise. Where SCR control has been indicated the heater shall be furnished with a solid state proportional power controller allowing modulation of heater capacity from 0 to 100% of full capacity. The SCR control shall energize the heater only for the number of AC cycles necessary to produce the amount of heat required. For heaters with loads greater than 90 amps SCR control combined with a step controller in a vernier configuration (still providing full proportional control) is acceptable. (Backup or safety contactors - where used - shall be magnetic type).

J. Electrical: Heaters shall be for use with electricity of the voltage and phase indicated, and provide the output and number of control stages indicated. Three phase heaters shall have equal balanced three phase circuits. Heater element circuits shall be subdivided so that no circuit load exceeds 48 amperes. All internal wiring shall be suitable for 220 degrees.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Comply with Section 20 05 00. Install in accordance with manufacturer’s written instructions, code, applicable standards and best construction practices.

B. Coordination: Coordinate heater power and control requirements with other trades; confirm location of any required heater contactors, relays, thermostats, and similar devices. Provide any required wiring for proof of fan operation between fan devices and heater; wiring shall comply with the HVAC control portion of the specifications and Division 26.

C. Location and Trim Verification: Install equipment at locations indicated in accordance with the Contract Documents. Review and confirm installation locations, that proper clearances are provided, unit controls are accessible, and installation has been coordinated with other trades.

D. Complete Connections: Connect and install all items shipped loose with units; provide and connect all contactors, relays, wiring, interconnections and accessories as required for proper unit operation.

E. Cleaning: Units shall be thoroughly cleaned (internally and externally) of all debris prior to operation. Units shall be clean and in new condition prior to Owner acceptance.

F. Owner Instruction: Instruct Owner on equipment operation and maintenance.

3.2 START-UP

A. Pre Start-Up Inspection: Inspect equipment and connecting systems to confirm equipment and connecting systems to confirm equipment has been installed properly and is ready for start-up. As a minimum, check for: proper voltage and phases, correct electrical connections, complete control connections, all unit safety devices properly set and connected, coils clear of obstructions, and other items as listed by the manufacturer are properly provided/connected and operating to ensure safe and proper start-up. If items are discovered that prevent start-up to be completed, notify the installing Contractor and Engineer of issues. Coordinate and re-schedule start-up after items are corrected.

B. Start-Up: Perform start-up in accordance with manufacturers written start-up procedures. Observe proper operation of all unit components.

C. Adjustments: Adjust and set unit components to allow for proper operation. Observe unit to detect any unusual vibration, leakage, loose wiring, or other situations that could affect unit operation.

END OF SECTION

SECTION 260100 – ELECTRICAL GENERAL REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A . Drawings and general provisions of the Contract, including General Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.

B . Division 27 - Communications.

C . Division 28 - Electronic Safety and Security.

1.2 SECTION INCLUDES

A . General requirements specifically applicable to Division 26.

1.3 SCOPE OF ELECTRICAL WORK

A . Provide electrical systems and Work described, identified, specified, referenced, and shown in the Project Documents that are covered under Division 26 of the Construction Specifications Institute (CSI) and/or as otherwise regulated by national, state, and local electrical codes. Electrical Work includes providing all equipment, materials, devices, appurtenances, and accessories necessary to provide complete and operating systems according to the intent of Project Documents.

B . Electrical work is not limited to Division 26 specifications and what is shown on the electrical drawings. The Contractor is responsible to review all Project Documents for additional Electrical Work and requirements and to include this work as part of their scope under the Contract.

1.4 REGULATORY REQUIREMENTS

A . Comply with requirements of the following codes as adopted and supplemented by authority having jurisdiction:

B . ANSI/NFPA 70 - National Electric Code (NEC)

C . NFPA 101 - Life Safety Code

D . International Building Code (IBC)

E . International Mechanical Code (IMC)

F . WAC 296-46B - Washington State Electrical Safety Standards, Administration, and Installation

G . Washington State Energy Code (WSEC)

H . Comply with additional codes and regulations referenced in other sections.

I . Comply with additional codes and regulations required by authority having jurisdiction.

J . Obtain and pay for permits, plan review, and inspections from authorities having jurisdiction over work included under applicable Division Sections.

K . Include all testing, shop drawings, and documentation required by the inspection authorities for permitting and final approval.

1.5 SUBMITTALS

A . Comply with requirements of Division 01. Unless otherwise specified, furnish product data and shop drawings to Architect/Engineer as follows:

1. Product information sheets shall be neat, readable, 8.5 x 11 inch, submitted in PDF format. Generic product sheets with multiple products or product descriptions shall clearly highlight or otherwise indicate which product is being furnished. Product sheets shall be reasonably limited to not include entire catalog sections.
2. Furnish product submittals with a cover sheet and table of contents. Furnish a separate submittal and number for each section of the specifications. Cover sheet shall indicate name of the Project, Owner, Architect, Engineer, Contractor, and Date of Submittal. Product table of contents shall list each item submitted. Bookmark each submittal to facilitate browsing according to the type of products.
3. Furnish systems design shop drawings in PDF format. Title block shall include Project, Owner, Contractor, and Date of Submittal.
4. Furnish product data and shop drawings specifically indicating any conflict or deviation from requirements of contract documents.
5. Edited Content: Submittals shall indicate the equipment and options that are to be provided. Copies of an unedited catalog will be Rejected. Pages/items that are not applicable shall be deleted prior to submittal to the Engineer.

B . Confirm dimensions, ratings, and specifications of electrical materials, devices, fixtures, and equipment conform to project requirements prior to furnishing submittals. Coordinate electrical requirements with utilization equipment submitted under other sections and verify that voltage, phase, and rating are compatible with work shown in the electrical project documents.

C . Provide shop drawings showing proposed feeder and branch circuit wiring plan required under Section 260500.

D . Do not order materials or commence Work until applicable submittal has been reviewed and the Architect/Engineer has accepted.

E . Re-Submittals: If submittals are marked ‘Rejected’ or ‘Revise and Resubmit’, the Contractor shall revise the submittal to satisfy the comments or conform to project requirements, and submit to the Engineer for review. Only those items that were rejected or required a

resubmittal will be reviewed by the Engineer; All other items will not be reviewed. All re-submittals shall be at least one of the following:

1. Provide a 'Re-Submittal Summary Sheet' which indicates how each comment was addressed (it is acceptable to add the responses to a copy of the original submittal review comments).
2. Cloud (or otherwise clearly identify) the revised portions to indicate what is different from the original submittal.

1.6 SUBSTITUTIONS

A . Comply with requirements of Division 01. Products specified by naming one or more manufacturers establishes a basis for quality, styling, capacity, and function. Unless otherwise specified, written requests for substitution must be received at least 14 days prior to Bid Opening by Architect/Engineer who will determine acceptability of proposed substitution. Written acceptance must be obtained from Architect/Engineer prior to Bid Opening.

B . Substitution requests may be submitted for any manufacturer or named product unless specified as "no substitute".

C . Substitution approval does not relieve the Contractor of complying with the work requirements or the concept and intent of the project documents. Pay for any and all additional project costs that may be caused by Contractor requested substitutions, regardless of whether or not additional costs are overlooked, missed, or unforeseen, and regardless of when substitutions may be approved.

1.7 QUALITY ASSURANCE

A . Experience: All work shall be performed by individuals experienced and knowledgeable in the work they are performing, and experienced with the same type of systems and building type as this project. By virtue of submitting a bid, the Contractor is acknowledging that workers to be utilized on this project have such experience and knowledge. Upon request of the Engineer, submit resumes showing the work history, training, and types of projects worked on, for individuals assigned to this project.

B . Code: Utilize workers experienced and knowledgeable with codes pertaining to their work; verify code compliance through-out the project.

C . Quality Assurance Checks: Prior to ordering products and making submittals, confirm the following for each:

1. General: Product is suitable for the intended purpose and complies with the Contract Documents.
2. Manufacturer: Product's manufacturer is listed as an acceptable manufacturer in the Contract Document's or a substitution request (where allowed) has been submitted and the manufacturer has been listed as acceptable.
3. Electrical (for products requiring electrical power):

a. Product is for use with the voltage/phase as indicated on the electrical plans (or for the electrical circuit the item will be connected to).

b. Product's ampacity requirements (MCA) do not exceed that indicated on the electrical plans (or for the electrical circuit the item will be connected to).

4. Weight: Product's weight is no greater than that indicated.

5. Space Verification: Product will fit in the space available, and along the path available to install the item, will have adequate service clearances, and will not impede on any clearances required for other items in the space the item will be located.

6. Installation: A suitable method for installing the product has been selected which meets the project schedule and other requirements.

7. Anchorage/Support: The manufacturers recommended method of anchorage and support is consistent with the method indicated in the Contract Documents, and the item has provisions suitable for such anchorage/support.

8. Lead Time: The product's fabrication, shipping, and delivery period meets the project schedule requirements.

9. Substituted Equipment: Where equipment is not the basis of design confirm all requirements for substituted equipment have been met and shop drawings of construction revisions have been (or are being) prepared.

10. Controls: Item is compatible with the controls it will be connected to and has been coordinated with the firm providing the project control work to provide the specified (or required) sequence of operation.

11. Listing: Item is Listed when required to be as such. And if the item is to be installed as part of a Listed system or assembly, it is compliant with the Listing of the overall system or assembly.

12. Existing Buildings/Systems: Product size, weight, connecting services (i.e. electrical, controls, power, plumbing, etc.) are configured and suitable for existing items they connect to or interface with.

D . Check-Out: The Contractor shall be responsible to verify that proper installation and proper connections have been provided for all mechanical work. Contractor shall provide installation checkout, start-up services, and perform a thorough check of all mechanical systems to verify proper installation and operation. Contractor shall operate all items multiple times under varying conditions to confirm proper operation. Contractor shall submit a checklist listing all equipment, fixtures, and similar items furnished on this project, with a date and initials indicating when the item was checked, a list of what was checked, and by whom. Such check shall, as a minimum utilize documents provided by the equipment manufacturer. Such a check-out is in addition to any commissioning activities specified (unless noted otherwise).

1.8 RECORD DOCUMENTS

A . Comply with requirements of Division 01. Maintain at project site one set of clean, dry, and legible red-lined record drawings for submittal at Contract Close-out. Record information concurrently with construction progress.

B . Indicate electrical changes in the contract documents. Include change orders, revised branch circuit and feeder wiring layouts, revised circuit identification, pull & junction boxes added during construction, and actual dimensioned location and routing of each underground conduit on record drawings.

C . Record branch circuit routing, switch legs, equipment connections, and home runs on the power and lighting plans. Indicate conduit size, wire counts, and conductor size if greater than a #12 2-wire branch circuit or feeder.

1.9 LABELING

A . Where labeling that includes room names and numbers is required for any system to identify devices or for programming purposes, use final room names and numbers determined during construction. Verify room names and numbers with Architect prior to manufacturing labels or programming software.

1.10 OPERATION AND MAINTENANCE MANUALS

A . Comply with requirements of Division 01. Unless otherwise specified, furnish one labeled thumb drive in PDF format and two duplicate hard copy printed sets of Operation and Maintenance Manuals prior to completion of contract. Submit hard copy manuals in labeled and indexed 3-ring binder(s).

B . Include the following information as applicable:

1. Names, addresses, and telephone numbers of the contractor, the installing sub-contractor, and the local representative for each system or equipment.
2. All approved product data and shop drawings.
3. Identify all manufacturer warranties which exceed one year.
4. Model number and serial number of each piece of equipment provided.
5. Data from test results performed under the Contract.

C . Operation and maintenance data shall include complete parts lists, installation and maintenance instructions, safety precautions, operation sequence describing start- up, operation, and shut-down, internal and interconnecting wiring and control diagrams with data to explain detailed operation and control, and testing methods for each system and item of equipment.

D . Furnish a draft copy of Operations and Maintenance Manual for Architect/Engineer review and incorporate comments prior to final submittal. Allow 14 days for Architect/ Engineer review.

1.11 CONFLICTS

A . Notify the Architect/Engineer of any conflicts or discrepancies before proceeding with any work or the purchasing of any materials related to the conflict or discrepancy until requesting and obtaining written instructions from the Architect/Engineer on how to proceed. Where conflicts occur, the most expensive and stringent requirement as judged by the Architect/Engineer shall prevail. Any work done after discovery of such discrepancies or

conflicts and prior to obtaining the Architect/Engineer's instructions on how to proceed shall be done at the Contractor's expense.

1.12 WARRANTY

A . In addition to requirements covered under General Conditions or Division 01, include manufacturer product warranties that exceed one year. Assemble or list warranties that exceed one year in Operation and Maintenance Manuals indicating start date. Certificates of extended warranty shall identify the Owner as the beneficiary.

B . If the Electrical Contractor does not have offices located within 150 miles of the project, provide a service/warranty work agreement with a local electrical subcontractor approved by the Owner. The service/warranty work agreement shall extend for the contract warranty period, and a copy shall be included in the Operation and Maintenance Manuals.

1.13 INTENT OF PROJECT DOCUMENTS

A . Drawings and specifications are complementary and what is called for in either is binding as if called for in both.

B . The drawings are diagrammatic and show the general arrangement of the construction and do not attempt to show all features of work, exact construction details, or actual routing of conduit and cable. Provide all necessary supports, off-sets, bends, risers, fittings, boxes, wiring, and accessories which are required for a complete and operating installation. Determine locations for required electrical outlets and connections prior to rough-in base on equipment product and installation submittal data and/or review of equipment on site.

C . The level of design presented in the documents represents the extent of the design being furnished to the Contractor; any additional design needed to perform the Work shall be provided by the Contractor. All design by the Contractor shall be performed by individuals skilled and experienced in such work, and where required by local code (or elsewhere in the documents) shall be performed by engineers licensed in the State where the project is located. Include in bid the costs of all such project design; including engineering, drafting, coordination, and all related activities and work. Contractor provided design services shall be included for but not limited to bidder design specifications, temporary electrical systems, layout routing to install the Work and share project space with other building systems, hanger and support systems, seismic bracing, preparation of shop drawings, locating and identifying requirements for equipment and fixture terminations, and methods/means of accomplishing the work.

1.14 COORDINATION

A . Examine architectural, civil, structural, and mechanical drawings and specifications and consult with other trades, as required to coordinate use of Project space and sequence of installation.

B . Arrange wiring and equipment to avoid interference with other work and to maximize accessibility for maintenance and repairs.

C . Coordinate with suppliers and installers to obtain product electrical data, shop drawings, and installation requirements for systems, equipment, and products furnished by Owner and/or other trades as required perform electrical work.

D . Contractor is responsible ensure that equipment, fixtures, and devices being furnished and installed shall fit the space available, taking into account connections, service access, and clearances required by product manufacturer and/or Code. Contractor shall make the necessary field measurements to ascertain the space requirements for proper installation, and shall furnish and/or install equipment so that final installation meets the intent of the Project Documents. If approval is received by Addendum or Change Order to use other than the originally specified items, Contractor shall be responsible for specified capacities and for ensuring that items to be furnished will fit the space available.

E . Contractor is responsible to review all the Project Documents and approved shop drawings provide under other divisions to identify and resolve conflicts between electrical systems and building construction, equipment, cabinets, counters, trim, and special finishes, prior to rough-in.

F . Facilitate coordination between low voltage system sub-contractors during construction. Include time for a minimum of one meeting with all sub-contractors prior to building rough-in to review requirements for each system per Section 260530. Include a second meeting with all sub-contractors to review requirements for all systems utilizing IP structured cabling prior to cover.

1.15 REQUIREMENTS FOR EQUIPMENT FURNISHED UNDER OTHER SECTIONS OR BY OWNER

A . Provide power wiring, disconnect switches, electrical connection of equipment, installation of furnished electrical controllers, parts, and accessories, and field wiring for systems, equipment, and products furnished under other divisions or by Owner. Install controllers, operator stations, and control devices such as limit and temperature switches furnished with equipment.

B . Review equipment submittals prior to electrical rough-in and installation. Verify location, rating, size, type of connections, and required space requirements. Coordinate field wiring requirements and details with supplier and installer. Notify Architect/Engineer of conflicts between requirements for actual equipment being furnished and equipment indicated in contract documents prior to commencing Work.

C . Provide motor controllers and operator stations unless otherwise indicated on the project drawings.

D . Make final connections to equipment. Provide cord and plug where required for plug-in connection.

DEFINITIONS

E . Electrical terms used in these specifications are as defined in NEC Art. 100 unless otherwise noted.

F . Abbreviations: Where not defined elsewhere in the Contract Documents, shall be as defined in RS Means Illustrated Construction Dictionary.

G . Accessible Ceiling: Signifies access that requires the removal of an access panel or similar removable obstruction.

H . As Required: As necessary to form a safe, neat, and complete working installation (or product), fulfilling all the requirements of the specifications and drawings and in compliance with all codes.

I . Concealed: Hidden from view as in walls, trenches, chases, furred spaces, crawl spaces, unfinished attics, and above suspended ceilings.

J . Conduit: Includes conduit and tubing raceways.

K . Coordinate: Accomplish the work with all others that are involved in the work by directly discussing the work with them, arranging and participating in special meetings with them to discuss and plan the work being done by each, obtaining and completing any necessary forms and documentation required for the work to proceed, reaching agreement on how parts of the work performed by each trade will be installed relative to each other both in physical location and in time sequence, exchanging all necessary information so as to allow the work to be accomplished with a united effort in accordance with the project requirements.

L . Equipment Connection: Make branch circuit connection, mount and connect control devices as required. Provide disconnect and overcurrent protection when required by NEC and IMC, if not otherwise indicated or furnished with equipment.

M . Exposed: Exposed to view in any room, hallway, passageway or outdoors.

N . Finished Areas or Spaces: Areas and/or spaces receiving a finish coat of paint on one or more wall surface.

O . Furnish: Obtain and/or prepare and deliver to the project.

P . Indicated: Shown, scheduled, noted, or otherwise called out on the drawings.

Q . Install: Enter permanently into the project complete and ready for service.

R . Open Cable or Wiring: Conductors above grade not installed in conduit or raceway.

S . Panel: Distribution panelboard, lighting and appliance panelboard, load center, and/or low voltage cabinet.

T . Provide: Furnish and install complete and ready for service.

U . Wiring: The assembly of conductors, raceways, an approved cable assembly, outlets, junction boxes, conduit bodies, fittings, and associated accessories.

V . Verify: Obtain, by a means independent of the project Architect/Engineer and Owner, the information noted and the information needed to properly perform the work.

1.16 SCHEDULE OF VALUES

A . Provide Schedule of Values for use by Architect/Engineer to evaluate progress payment requests during construction.

B . Submit Schedule of Values for review and approval. Include additional line items as requested.

PART 2 - PRODUCTS

2.1 MATERIALS, EQUIPMENT

A . General: Furnish only products that are new and free from defects with a manufacture date that is less than six months from date of installation. Where product and applicable software updates or upgrades are available from the manufacturer, furnish the latest version unless otherwise specified. Furnishing discontinued products and/or products of manufacturers who are no longer in business is not permitted.

B . Listing and Labeling: Furnish and install only products that are listed and labeled by one or more of the following testing laboratories as approved by the Authority Having Jurisdiction:

Underwriter's Laboratories, Inc.	(UL)
ETL Testing Laboratories, Inc.	(ETL)
Factory Mutual	(FM)

C . Each specified product and system to be furnished shall be from a single approved manufacturer. Providing multiple product brands or manufacturers for each type or category, or for multiple units of the same specified product and/or system, is not permitted.

D . Products shall be delivered, handled, and stored per manufacturer recommendations. Protect fixtures, materials, and equipment from rain, water, dust, dirt, snow, and damage. Do not install products that have marred, scratched, deformed, or otherwise damaged. Do not install products that have been wet or exposed to the weather prior to assembly and/or installation.

PART 3 - EXECUTION

3.1 WORKMANSHIP

A . Electrical work shall conform to requirements of ANSI/NECA 1-2015, Standard Practice of Good Workmanship in Electrical Construction.

3.2 INSTALLATION

A . Provide all electrical work as specified and shown in the Project Documents. Provide all labor, equipment, material, accessories, and testing for electrical systems complete and operating. Include all scaffolding, rigging, hoisting, and services necessary for delivery and installation of materials and equipment.

B . Include all required software applications, licensing and associated system programming for electronic products. Provide all software to owner for onsite programming and interfacing.

C . Provide as part of the Electrical Work all hangers, brackets, supports, framing, backing, accessories, incidentals, not specifically identified the project documents, but required to complete the system(s) in a safe and satisfactory working condition.

D . Quantity of materials and layout of the Work shall be provided based on field measurement of the actual project conditions and shall not be based on plan dimensions.

E . Provide all testing and documentation of electrical systems as required to demonstrate compliance with the Project Documents.

F . Provide testing, documentation, and filing required to comply with commissioning requirements of Section C408 of the Energy Code. Include documentation in Operation and Maintenance Manuals.

3.3 CUTTING AND PATCHING

A . Provide cutting and patching to complete electrical work and to provide openings in elements of Work for electrical penetrations. Comply with requirements of Division 01.

B . Locate and execute cuts so as not to damage other work or weaken structural components. Core drill or saw cut rigid materials.

C . Patch to restore to original condition. Refinish surfaces to match adjacent finishes. For continuous surfaces, refinish to nearest intersection; for an assembly, refinish entire unit.

END OF SECTION

SECTION 260500 – BASIC MATERIALS & METHODS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A . Drawings and general provisions of the Contract, including General Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.

B . Excavation and Backfill for Underground Conduit: Comply with Division 31 - Site Clearing and Division 31 - Earthwork.

C . Concrete for Encased Conduit: Comply with Division 03 - Concrete.

D . Section 260100 - Electrical General Requirements.

E . Materials and Methods for Utility Services: Comply with Section 260580.

1.2 SECTION INCLUDES

A . Conduit and Fittings.

B . Building Wire and Cable.

C . Wiring Connections and Terminations.

D . Boxes.

E . Wiring Devices.

F . Cable Tray.

G . Supporting Devices.

H . Requirements for Fire Rated Construction.

I . Earthwork for Underground Electrical.

1.3 SUBMITTALS

A . Submit product data for conduit fittings, wire and cable, watertight connectors, wiring devices, floor boxes, cord reels, smoke detectors, and cable tray.

B . Submit shop drawings for installation of cable tray, including wire basket type.

C . Submit reports for tests required under Part 3 of this section.

1.4 OPERATION AND MAINTENANCE DATA

A . Include data for wiring devices, floor boxes, smoke detectors, and cable tray in Operation and Maintenance Manuals.

PART 2 - PRODUCTS

2.1 CONDUIT

A . Rigid Steel Conduit (RGS): ANSI C80.1; hot dipped galvanized.

B . Intermediate Metal Conduit (IMC): Hot dipped galvanized.

C . Electric Metallic Tubing (EMT): ANSI C80.3; galvanized tubing.

D . Flexible Metal Conduit: Galvanized steel. Heavy wall except reduced wall may be used where concealed in building construction.

E . Liquid Tight Flexible Metal Conduit: Galvanized steel, PVC jacket.

F . Non-Metallic Conduit: NEMA TC 2; EPC-40-PVC and EPC-80-PVC.

2.2 FITTINGS

A . RGS and IMC Conduit: ANSI/NEMA FB 1; threaded type. Provide bushings, hubs and connectors with insulated throat, for conduit terminations.

B . EMT Conduit: ANSI/NEMA FB 1; steel, compression type. Crimp-on, drive-on, indenter, and set screw type prohibited. Provide connectors with insulated throat for conduit larger than 3/4-inch diameter. Provide raintight fittings for conduit installed outdoors.

C . Flexible Conduit: ANSI/NEMA FB 1; steel, single screw squeeze type.

D . Liquid Tight Flexible Conduit: ANSI C33.84, steel. Provide PVC coated fitting where installed outdoors.

E . PVC Conduit: NEMA TC 3; solvent welded type, same manufacture as conduit. Provide bushings, hubs and connectors with insulated throat, for conduit terminations.

F . Water and Vapor Conduit Sealants: Hydra-Seal S-50 conduit sealing putty or approved; Tyco/Rachem/TE blank duct plug or approved; Polywater FST conduit sealing foam system or approved.

G . Expansion Fittings for PVC Conduit: Same manufacture as conduit.

2.3 WIRE AND CABLE

A . Copper Building Wire, Interior: Type THWN-2, 600 volt insulation; conductors 8 AWG and larger shall be stranded. Type XHHW-2 may be substituted for conductor sizes 4 AWG and larger.

B . Copper Building Wire, Outdoors: Type RHW/USE-2, 600 volt insulation; conductor 8 AWG and larger shall be stranded.

C . Fire Rated Building Wire: Type RHH or RHW-2, UL2196, 600 volt insulation, copper conductor, UL classified 2-hour rated cable when installed in approved steel conduit system. Type RHH may be used only in dry locations.

D . Flexible Cords: Oil resistant thermoset insulated Type SO multi-conductor with identified equipment grounding conductor, sized for connected load of equipment and rating of branch circuit overcurrent protection.

2.4 WIRE CONNECTORS

A . Connectors for Wire Size 10 AWG and Smaller: Insulated steel spring twist-on pressure connector with plastic cap. Outdoors use watertight type with prefilled sealant gel.

B . Connectors for Wire Size 8 AWG and Larger: Solderless mechanical or compression type with pre-formed or shrink sleeve insulated cover. Outdoors make watertight using shrink sleeve or pigtail cap and sealing mastic.

C . Outdoor Taps Below Grade for Wire Size #6 AWG and Larger: Ilsco PED series underground multi-tap, wire range and number of ports as required.

D . Gutter/Wireway Taps for Wire Size #6 AWG and Larger: Ilsco type PDB series AL/CU lug type distribution block, number of poles and quantity/size of primary/secondary lug ports as required for the application.

2.5 BOXES

A . Outlet Boxes: ANSI/NEMA OS 1; galvanized sheet steel, with 1/2-inch male fixture studs or plaster rings as required.

B . Surface Outlet Boxes Below 8 Feet: Cast aluminum or malleable iron, threaded hubs.

C . Surface Outlet Boxes for Outdoor and Wet Locations: Cast aluminum with baked enamel or epoxy finish, Fiberglass reinforced polyester (FRP), gasketed cover, stainless steel hardware. Outlet boxes shall have threaded hubs.

D . Concrete and Masonry Boxes: Galvanized steel, suitable for the purpose.

E . Junction and Pull Boxes: Outlet box with blank cover except boxes larger than 4 inch square shall be screw cover type, galvanized steel with grey enamel finish, NEMA 1 indoors and NEMA 3R outdoors, unless otherwise indicated.

F . In-Ground Boxes: Concrete type with locking cover. Provide traffic ratings, dimensions, features, and installation requirements indicated.

G . Work Station Outlets: SMI Spider/Hubbell Multi-Connect System recessed wall box with almond (ivory) trim plate and one internal movable barrier. Provide 4 or 6 gang outlet as indicated.

H . Fire Rated Construction: Recessed outlet boxes and rough-in cans that are installed in 2 hour rated area separation walls shall be UL listed with 1-1/2 hour rating label.

I . Barriers: Provide permanent barriers in outlet boxes to separate adjacent wiring devices where voltage exceeds 300 volts. Provide permanent voltage separation barriers in outlet and junction boxes to separate wiring above 100 volts from wiring below 100 volts and where otherwise required by Code.

J . Color Coding of Device and Junction Boxes for Special Systems: Field painted or otherwise manufactured in the specified color, both inside and outside of box and cover. Provide color identification for the following electrical systems: Fire Alarm System - RED, Emergency Systems (NEC 700) - ORANGE.

K . Sound Attenuation Wrap: UL listed, 0 VOC, sound attenuating wrap for sealing around outlet boxes. SpecSeal SSP Putty Pad or approved.

2.6 WIRING DEVICES

A . Wall Switches: Hubbell 1221, Leviton 1221, Pass & Seymour 20AC1, Cooper 2221; specification grade, 20 ampere, 277 volt, quiet type. Single pole, double pole, 3-way, 4-way as required. Color: Ivory.

B . Duplex Receptacles: Specification grade 5362 series, NEMA 5-20R, grounding type, as manufactured by Hubbell, Leviton, Pass & Seymour, Cooper. Color: Ivory

C . Receptacle assemblies face up located in Counter Tops and Work Surfaces: Same manufacturer, rating, and style as specified for duplex or GFCI receptacles except receptacle assemblies shall be listed for the application.

D . Duplex Receptacles, Controlled: Same manufacturer, rating, and style as specified for duplex receptacles except devices shall have special purpose identification symbol and permanently marked with the word “controlled” visible on face of each receptacle automatically controlled. Color: as selected. Automatic control devices for receptacles are specified under Section 260920, Lighting Controls.

E . Ground Fault Circuit Interrupter (GFCI) Receptacles: Same manufacture, rating, and color as duplex receptacles except devices shall comply with UL 943, Class A, with self test.

F . Duplex Receptacles, Weather Resistant for Damp and Wet Locations: Same manufacture, rating, and color as duplex and GFCI receptacles except devices shall be UL listed as weather resistant and permanent special purpose identification shall be visible on the device.

G . Flush Mounted Device Plates: Super heavy duty for high abuse application, rigid high impact thermoplastic, smooth finish, color to match device. Thermoset, phenolic, urea, nylon, and flexible polycarbonate not approved.

H . Surface Mounted Device Plates: Raised galvanized steel on steel boxes; cast or stamped sheet aluminum on cast boxes.

I . Damp and Wet Location Device Plates: ANSI/UL 514D; Commercial grade, low profile, lockable, die cast metal cover assembly, listed as weatherproof when in use and identified as extra duty. Hubbell/TayMac MX series or approved.

J . Work Station Outlet Plates: Provide one manufactured system device plate for each outlet gang position (power, signal, or blank) as indicated, color to match outlet trim. Coordinate signal plate configuration with Owner.

2.7 CABLE TRAY FOR COMMUNICATIONS AND SIGNAL CIRCUITS

A . MDF/IDF Room Cable Tray: NEMA VE 1, class 12A, aluminum open ladder type with 9 inch rung spacing; 4 inch deep with side rails open sided rungs each side of center rail.

B . Distribution Cable Tray: NEMA VE 1; high strength welded steel 2 inch x 4 inch pattern wire mesh basket type tray, pre-galvanized zinc or zinc plated with clear sealer, 4 inch deep x 12 inch wide unless otherwise indicated. Chalfant VersaTray, Cooper B-Line WB Series, GS Metals Flextray, or approved.

C . Accessories: Provide manufacturer's standard elbows, tees, clamps, connectors, splice plates, hangers, brackets, supports, and attachments. Elbows and tees shall have 24 inch radius.

D . Wall Sleeves: Galvanized steel wall sleeve accessory, flanged each end, and sized to accommodate cable tray installed.

2.8 SUPPORTING DEVICES

A . Metal Conduit Clamps and Straps: Steel, screw type; zinc or cadmium plated minimum indoors, hot dipped galvanized minimum outdoors.

B . Support Channel: Slotted 12-gauge steel channel with fittings, fasteners, brackets, clamps, floor plates, and accessories required; Pre-galvanized zinc coated (G90) indoors, ASTM 123 hot dipped galvanized outdoors.

C . Fasteners: Expansion anchors in concrete and solid masonry; toggle bolts in hollow masonry, plaster, or gypsum board wall construction; sheet metal screws in metal construction; wood screws in wood construction; set screw type beam clamps on steel columns and beams; U.L. listed clips for metal studs. Metal parts and accessories to be zinc or cadmium plated minimum indoors and hot dipped galvanized minimum outdoors.

D . Support Wires: Support wires above accessible ceiling grids, steel #12 AWG minimum.

E . Roof Supports: Do not install conduit exposed on roofs. Free standing, stackable, 7.5 inch square, one piece molded PVC pipe support with U shaped rolling cradle, MIRO Industries Pillow Block #24-R. Free standing molded thermoplastic pyramid style block with hot dipped galvanized channel strut support hardware, Erico Caddy ST series or approved.

2.9 ACCESSORIES

A . Air-Vapor Barriers:

1. Pre-molded polyethylene box installed in all exterior framing walls (thermal envelope) around recessed outlet boxes. Lessco or equal.

2. Foam electrical outlet gaskets for installation between device plate and finished outlet. Conceal behind device plate. Outlet gaskets or equal.

3. Interior; continuous fiber pulling line, 190# tensile strength.

4. Below grade; Polyester measuring pulling tape 5/8 inch wide, 1800# tensile strength. Muletape.

B . Warning Tape: 6 inch wide detectable underground warning tape, black lettering, on red background for high voltage, yellow background for medium voltage and general utility, orange background for low voltage, with wording to describe buried installation.

2.10 FIRE RATED CONSTRUCTION

A . Products for Fire Stopping to Seal Around Enclosures and Annular Space between Conduit and Building Construction at Conduit Penetrations: ANSI/UL 1479; Comply with requirements of Division 07.

B . Conduit Sleeves for Open Cable: ANSI/UL 1479; Fire stop conduit sleeve kit, with mounting escutcheons, gaskets, end bushings, warning labels, and non-hardening fire stop putty. SpecSeal READY SLEEVE, FS100 (1 inch diameter sleeve) and FS200 (2 inch diameter sleeve), or approved.

C . Pathway Sleeves for Open Cable, Greater than 2 Inch Diameter: ANSI/UL1497; Fire stop rectangular sleeve kit, 3-inch wide by 3-inch high by 10.5-inch length, expandable in 6-inch increments, self-contained integral fire sealing system that automatically adjusts to the installed cable loading. Provide radius control modules (each end of pathway), single or multiple gang wall kits, and expansion modules as required. Specified Technologies, Inc., EZ-Path System Series 33 or approved.

PART 3 - EXECUTION

3.1 WIRING METHODS

A . General:

1. Fixed wiring shall be conductors installed in conduit.

2. Conceal all wiring within construction unless otherwise noted on drawings or specifically authorized by the Architect/Engineer.

3. Where contractor wiring methods require the application of conductor ampacity adjustment or correction factors under NEC 310.15, the contractor shall submit calculations that show Code compliance, except the adjusted ampacity of the conductors installed shall not be less than the circuit overcurrent device rating shown or specified.

4. Conduit sizes shall not be reduced to smaller size than shown or otherwise noted on plans.

5. Feeders shown or otherwise noted on plans shall not be combined to share a common conduit homerun. Branch circuit homeruns shown or otherwise noted on plans shall not be combined to share a common conduit with other circuits.

6. Device Plates: It is the electrical contractor’s responsibility to ensure that all line voltage and low voltage system faceplates and visible trim pieces are the same color. Exception:

Where stainless steel device plates are used for line voltage systems, low voltage systems may use non-metallic plates of the same color.

B . Conduit Requirements:

1. Rigid Steel Conduit (RGS): May be used in all areas. Required at penetrations thru fire rated construction rated greater than 1 hour.
2. Intermediate Metal Conduit (IMC): May be used in all areas except where RGS is required or indicated.
3. Electrical Metallic Tubing (EMT): May be used in dry and damp locations where not subject to damage. May not be used in concrete, where in contact with earth, or where RGS is required or indicated. May not be used for service entrance conductors inside a building. Maximum trade size 2 inches.
4. Flexible Conduit: May be used concealed in casework and where concealed in walls up to 1 inch maximum trade size. Required for final equipment connections (maximum length 36 inches), to recessed lighting fixtures from an outlet box (maximum length 72 inches), and where raceway passes thru seismic joints. Use liquid tight in damp or wet locations.
5. Rigid Non-Metallic Conduit (PVC): May be used underground. May be used within buildings where encased in not less than 2 inches of concrete. Terminate inside building using RGS or IMC elbow and riser to first coupling above slab on grade.

C . Wire and Cable Requirements:

1. Use copper conductors, except Contractor may use aluminum conductors only for copper conductors sizes 3 and larger providing conductor and conduit sizes are increased to equal ampacity of copper sizes. Submit list indicating conduit and aluminum conductor sizes proposed for Engineer's approval. Engineer's decision as to equivalent sizes for aluminum conductors and conduit will be final.

3.2 SUPPORT - GENERAL

A . Support wiring, conduit, raceways, boxes, equipment, and fixtures from building structural members. Provide additional framing, channel, or listed support attachments as required to span or support between structural members and to avoid interference from pipes, ducts, and other equipment.

B . Do not install support anchors to penetrate thru roof deck.

C . Do not violate the integrity or exceed the capacity of the building structure used for support. Provide/fabricate additional support elements to transmit loads to the floor or other parts of the building structure that can carry the load as approved by the Architect/Engineer.

3.3 CONDUIT SIZING, ARRANGEMENT, AND SUPPORT

A . Minimum conduit trade size 1/2-inch diameter except all homeruns and where installed below grade outdoors conduits shall be 3/4-inch minimum diameter. Prewired 3/8 inch diameter flexible conduit not to exceed 72 inches in length may be used for fixture whips from an outlet box to recessed light fixture.

B . Arrange conduit to maintain headroom and present a neat appearance.

C . Route conduit parallel and perpendicular to walls and adjacent piping.

D . Maintain 12-inch clearance between conduit and heat sources such as flues, steam pipes, and heating appliances.

E . Locate holes in joists within center third of member depth measured from the edge and at least 24 inches from load bearing points. Maximum hole diameter one inch.

F . Support conduits from building structure with conduit straps or rods and hangers. #8 solid wire and CADDY clips may be used to hang 3/4-inch diameter conduit and smaller above accessible ceiling spaces.

G . Group conduit in parallel runs where practical and use conduit rack constructed of steel channel with conduit straps or clamps. Provide space for 25 percent additional conduit.

H . Do not support conduit with perforated pipe straps or tie wraps. Remove all wire used for temporary conduit support during construction, before conductors are pulled.

I . Do not bore holes in truss members or notch structural members.

J . Steel conduit installed as part of a 2 hour fire rated wiring assembly shall be supported 5 feet on center where required by the cable system installation requirements.

3.4 CONDUIT INSTALLATION

A . Use conduit hubs or sealing locknuts for fastening conduit to cast boxes and for fastening conduit to sheet metal boxes in damp locations.

B . Use conduit bodies to make sharp changes in direction, as around beams.

C . Use factory elbows for PVC conduit and for bends in metal conduit larger than 1 inch. Conduit bends for signal systems that are greater than 45 degrees shall be minimum radius sweeps as follows:

Under 2 inches	Standard radius
2 inches - 3 inches	24 inch radius
Over 3 inches	36 inch radius

D . Use factory RGS elbows for PVC conduit runs below grade.

E . Install insulated bushings on each end of conduit larger than 1 inch.

F . Use suitable conduit caps to protect installed conduit against entrance of dirt and moisture.

G . Install pull wire in empty conduits.

H . Conduit in Concrete Slabs Above Grade: Do not install in concrete slabs above grade except where written approval and installation requirements are provided by the Architect/Engineer.

I . Metal Conduit Installed Below Grade: Provide 20 mil thick factory PVC coating or field wrapped using corrosion protection tape and primer system with 50 percent wrap overlap; extend 8 inches above grade at risers.

J . Conduit Below Concrete Slabs On Grade: Install at minimum depth required for vertical penetration of radius bend at conduit risers, except install at minimum 48 inch depth for power systems above 600 volts and for feeders below 600 volts and rated 1000 amps and larger. See paragraph Earth Work for Underground Electrical under this section for thermal backfill requirements.

K . Underground Conduit for Site Power (Below 600 Volts) and Signal Systems: Install to provide 24 inches minimum cover up to final grade unless otherwise indicated or specified. Maintain minimum 7.5 inch on center spacing between power conduits; maintain minimum 12 inch spacing between power conduits and signal conduits; maintain minimum separation from public utilities established by regulation. See paragraph Earth Work for Underground Electrical under this section for thermal backfill requirements.

L . Conduits at Roof Decks: Conduit installed within 1.5 inches of the nearest surface of metal corrugated roof decks and conduit concealed within roofing systems on top of roof decks shall be RGS or IMC conduit.

M . Install flexible conduit thru oversized bushed sleeve or cored opening where conduit crosses building wall expansion or seismic joints. Provide up to 54 inches of flexible wiring with 6 inches minimum of conduit slack each side of the wall assembly to allow for free movement across the joint.

N . Do not install conduit in concrete slab on grade.

O . Do not install conduit in direct contact with underside of roof deck.

P . Seal all underground conduits entering and terminating within a building or structure using approved non hardening duct seal putty or a sealing bushing. Seal spare conduits using a watertight blank plastic duct plug. Seal all underground conduits entering and terminating below grade, such as in a crawl space or basement, using an approved closed cell foam sealant system.

3.5 CONDUIT PENETRATIONS

A . Roof Penetrations: Provide flashing around each conduit which penetrates a roof. Materials and installation shall comply with applicable provisions of Division 7 for roofing. Seal top of flashing around conduit with a weatherproof non-hardening mastic.

B . Exterior Walls: Core drill or cast sleeve for each conduit one size larger than conduit diameter. Seal all openings at each penetration with acrylic weatherproof caulking suitable for painting. Below grade seal with "Chase-Foam" silicone sealant or other approved method acceptable to Architect/Engineer.

C . Interior Walls and Partitions: Cut one size larger than conduit diameter. Seal all openings at each penetration with low VOC level general purpose interior sealant as specified in Division 07.

D . Fire Rated Construction: Comply with requirements of paragraph, FIRE RATED CONSTRUCTION, this specification.

3.6 CONDUCTOR INSTALLATION

A . Minimum Conductor Size: #12 AWG, except #10 AWG minimum for outdoor and exterior building lighting circuits and #14 AWG minimum for control circuits and for lighting fixture taps not to exceed 72 inches.

B . Splice conductors only in junction or outlet boxes and handholes.

C . Arrange conductors neatly at termination such that a clamp-on ammeter may be used.

D . Clean conduit free of debris before conductor installation; install conductors using pulling lubricant.

3.7 ALUMINUM CONDUCTORS

A . Terminate aluminum conductors with compression lugs and connectors. Compression copper pigtail or pin type connectors may be used at mechanical lugs.

B . Use anti-oxidant compound on aluminum conductor strands at all connections and terminations.

3.8 CONDUCTOR IDENTIFICATION

A . Provide non-metallic wire markers on each conductor in panelboards and in junction boxes having more than 6 conductors. Identify branch circuit or feeder number for power and lighting circuits.

B . Color Coding of Insulated Equipment Ground: Solid green.

C . Color Coding of 208/120 Volt System: Phase A - black, Phase B - red, Phase C - blue, Neutral - white.

D . Color Coding of Switch Legs: Pink.

E . Color Coding of Travelers (3-Way and 4-Way Switching): Purple.

F . Provide color tracers on neutrals to differentiate circuits on multi-wire branch circuits with separate neutrals.

3.9 BOX LOCATIONS

A . Provide electrical boxes for outlets, junctions and equipment connections as shown and as required for splices, taps, wire pulling, and code compliance.

B . Electrical box locations shown are approximate unless dimensioned. Obtain equipment outlet locations from equipment manufacturer prior to rough-in. Coordinate outlet and wall switch locations with casework and finish elements shown on Architectural drawings. Install to fit conditions or as directed.

C . Change location of wall outlets, wall switches, and lighting outlets up to fifteen feet without charge when requested by Architect/Engineer prior to installation.

D . Height of outlets unless otherwise directed: See Drawings.

3.10 BOX INSTALLATION

A . Set wall outlet and wall switch boxes vertically.

B . Support boxes independently of conduit, piping, and ductwork; securely fasten in place.

C . Provide recessed outlet boxes in finished areas. Flush front edge of box or plaster ring even with finished surface.

D . Provide blank cover plate over all boxes that do not contain devices or are not covered by equipment.

E . Do not install flush boxes on opposite sides of a wall within the same stud space. Maintain 24 inch minimum box separation in fire rated wall assemblies.

F . In-Ground Boxes: Set on 9 inch minimum deep gravel base extending 6 inches minimum beyond each side. Set flush with final grade.

3.11 WIRING DEVICES

A . Ground Fault Circuit Interrupter (GFCI) Protection: Provide for receptacles located outdoors, within 6 feet of sinks, in bathrooms, kitchens, indoor wet locations, locker rooms with associated shower facilities, elevator pits, elevator machine rooms, crawl spaces, garages, service bays, rooftops, at counters and work surfaces where food and/or beverage preparation occurs, water coolers, and as otherwise indicated. GFCI receptacles are not required where branch circuit is protected by GFCI circuit breaker.

3.12 CABLE TRAY FOR COMMUNICATIONS CIRCUITS

A . Install in accordance with requirements of NEMA VE 2 and manufacturer's instructions. Provide shop drawings for installation of cable trays showing layout, supports, connectors, accessories, and installation details.

B . Unless otherwise indicated support cable tray from building structure with center support using 1/2-inch threaded rod. Provide supports at each end, each connection point, and other points required to maintain maximum support spacing of 12 feet on center for ladder type tray and 6 feet on center for wire basket type tray.

C . Install warning signs 50 feet on center along cable tray to read "WARNING! DO NOT USE CABLE TRAY AS WALKWAY, LADDER, OR SUPPORT. USE ONLY AS MECHANICAL SUPPORT FOR CABLES."

D . Seismic Restraint: Provide seismic bracing of suspended cable tray. Comply with product manufacturer’s standard installation details and recommendations for Seismic Design Category F.

E . Coordinate cable tray layout and installation with HVAC and Plumbing requirements. Locate supports to clear ducts, equipment and piping. Allow for offsets to share space at three locations minimum.

F . Provide wall sleeve wherever cable tray passes through a wall or other permanent partition. Do not install cable through fire rated construction.

3.13 FIRE RATED CONSTRUCTION

A . Verify location of fire rated walls and ceilings with Architectural plans prior to rough-in.

B . Installation of boxes, rough-in cans, conduits, and sleeves that result in membrane or through penetrations shall comply with IBC 712.1 through 712.4 as required to maintain fire rating of construction assembly. Coordinate locations and construction requirements with General Contractor.

C . Provide approved conduit and/or pathway sleeve kits for installation of open cable through fire rated construction.

3.14 EARTHWORK FOR UNDERGROUND ELECTRICAL

A . Locating and Protecting Existing Utilities: Existing utilities in areas of new construction must be identified and located by the Contractor prior to commencing Work. Location of underground utilities shown on plans are diagrammatic and shall not be considered as a complete representation of all utilities that may exist on site.

1. Coordinate with Owner to identify and locate existing underground utilities including landscape irrigation in areas of Work.
2. Prior to excavation, contact and coordinate with local Utilities Underground Location Center to identify and locate existing underground public utility services in areas of Work, including power, water, sewer, telephone, gas, and cable TV.
3. Prior to excavation, obtain services of a utility locator service to scan areas of Work and to locate and mark where known and unknown private underground utilities or other interfering obstructions exist.
4. Existing active utilities damaged or interrupted by the Contractor during construction shall be replaced at the Contractor's expense. Repairs to power and signal systems using junction boxes or splices will not be accepted.

B . Excavation and Backfill:

1. Saw cut and remove pavement and hard surfaces along straight parallel lines.
2. Dig trenches of uniform width and depth. Provide uniform grade at bottom of trenches and excavations free of rocks, debris, and soft spots. Over depths shall be filled with sand.
3. Tree Roots: Hand excavate near trees to expose roots. Tree roots 2" to 5" in dia. are to be cut with a sharp saw and tree root heal material applied. For roots 5" in dia. and larger, do not cut. Tunnel under to install conduit.
4. Backfill materials shall be soil free of debris, roots, wood, refuse, and of rocks exceeding 3 inches in largest dimension. Bedding and backfill up to 12 inches of cover shall be

select fill consisting of building sand or backfill material free from particles that would be retained on a 3/8-inch sieve.

5. Place backfill in 6 inch loose lifts and compact to 95% of maximum density in accordance with ASTM D1557, except the first 6 inches of backfill material above PVC conduit shall not be compacted.

6. Removed material, excess material, and excavated material not suitable for use as backfill shall be removed and legally disposed off Owner's property.

7. Provide de-watering of trenches and excavations as required to perform work.

8. Barriers, Trench Covers, Safety Guards, Warning Lights: Provide protection against damage and injury to the public and to those persons using premises while work is in progress. Comply with applicable law and ordinance.

C . Thermal Resistivity of Bedding and Backfill Around Cable and Conduit Not Concrete Encased: Provide suitable materials that have a maximum thermal resistivity (Rho) of 90 when compacted and moist. Native or imported materials shall be approved by the Civil Engineer to verify thermal compliance. Man made and/or mixed materials shall be provided with a certification by the manufacturer verifying thermal compliance.

D . Thermal Backfill to Dissipate Conductor Heat: Low strength fluidized thermal backfill (FTB) shall be used for underground wiring above 600 volts and for underground wiring below 600 volts that is rated 2000 amps and above. Conform to local electric utility FTB specifications.

E . Finish Operations:

1. Restore all surfaces disturbed by new construction to its original grade and condition unless otherwise indicated. Comply with requirements of Divisions 31 and 32.

2. Landscape materials shall be similar type and quality as that removed. New topsoil shall be three-way mix (50% black silt sand, 30% peat moss, 20% chicken manure), 2-inch minimum depth. Top dress and seed damaged turf areas using approved seed mix and application rate. Repair paved surfaces as indicated.

3. Correct settling that occurs during the project warranty period. Restore grade, appearance, quality, and condition of surface or finish to meet original Contract requirements.

3.15 LABELING

A . Outlets: Identify panel and circuit number on faceplate of convenience and special purpose outlets. Use self-adhesive, polyester or vinyl laminated labels with machine generated alpha-numeric circuit identification, 1/4-inch high black letters on clear background. Exception: Use white letters on black or brown color device plates.

B . Junction Boxes: Label or mark cover with panel and circuit number. Locate on inside of cover except locate on outside of junction box cover in attics, crawl spaces, equipment rooms and above accessible ceilings.

3.16 TESTS

A . Perform continuity test on all feeder and branch circuit conductors. Verify proper phasing and that no short circuits or accidental grounds exist.

B . Check all convenience outlets for correct wiring connections using a polarity circuit tester. Test AFCI and GFCI circuits for proper operation with an approved tester.

C . Torque test conductor lug terminations to manufacturers recommended values.

END OF SECTION

SECTION 260526 – GROUNDING AND BONDING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A . Drawings and general provisions of the Contract, including General Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.

1.2 SECTION INCLUDES

A . Power System Grounding.

B . Electrical Equipment and Raceway Grounding.

C . Communication System Grounding.

1.3 SUBMITTALS

A . Submit reports for tests required under Part 3 of this section.

1.4 OPERATIONS AND MAINTENANCE DATA

A . Include data on testing procedures, obtained test values, and correction of deficiencies in the Operation and Maintenance Manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

A . Ground Rods: Copper-clad steel, 3/4 inch diameter, 10 feet long unless otherwise indicated.

B . Mechanical Connectors at Accessible Ground Rods: Tin-plated, heavy duty, high strength, corrosion resistant copper alloy, hex head bolt and clamp.

C . Mechanical Connectors at Ground Connections: Heavy duty, solderless, bolted pressure or compression type connectors or clamps labeled as being suitable for the purpose. Manufacturer's standard grounding lug when furnished as part of panelboards and other equipment.

D . Exothermically Welded Connections: Copper Thermit weld process conforming to manufacturer's instructions; use molds, weld material, tools, and accessories supplied by the manufacturer. ERICO CADWELD or equal.

E . Ground & Bonding Conductors: Bare, soft drawn copper; stranded for 8 AWG and larger, unless otherwise indicated or specified. Equipment grounding conductors may be insulated with green color identification per Code.

F . Grounding Bus Bars: UL 467; 1/4 inch thick x 4 inch high tin plated copper bus with predrilled holes for bolted lug terminations, 2 inch high insulated spacers, and stainless steel standoff wall brackets. Provide 16 inch long with holes for (8) horizontal terminations unless otherwise indicated.

PART 3 - EXECUTION

3.1 INSTALLATION

A . Ground electrical service system neutral per Code. Size grounding electrode conductor, main bonding jumper, equipment bonding jumpers, and supplemental electrode bonding connections per applicable paragraphs of NEC Article 250 except when larger size is shown or specified. Minimum of two (2) NEC 250.52 permitted grounding electrodes must be installed and shall include a concrete encased electrode where concrete building foundation is provided.

B . Make grounding connections which are buried or otherwise inaccessible using exothermic welds. Where installed outdoors, bury ground conductors with minimum 18 inches of cover unless otherwise indicated.

C . Driven Electrodes: Drive ground rods full depth unless otherwise indicated or specified. Provide 15 feet minimum separation between driven electrodes.

D . Equipment Grounding Conductor: Provide separate insulated green equipment grounding conductor in feeders and in branch circuits to plug-in outlets. Provide equipment grounding conductor in non-metallic conduits and flexible conduit. Size equipment grounding conductors per NEC 250.122 unless larger size is shown or specified.

E . Provide grounding locknuts on each end of feeder conduits serving panelboards. Exception: Provide grounding bushing with bonding jumper where conduit is used as equipment ground.

F . Provide conduit sleeves where ground conductors pass through concrete slabs. Metal conduit sleeves shall have threaded end extending above slab to accommodate a grounding bushing or conduit hub per NEC 250.64(E).

G . Provide minimum 1/0 AWG conductor for communications service grounding. Leave 10 feet slack conductor at terminal board. Connect conductor to building ground electrode system.

H . Ground exposed non-current carrying metal parts of equipment fastened in place or connected by permanent wiring and likely to become energized per Code. In MDF and in IDF rooms, bond cable trays and equipment racks to terminal board ground bus using #6 minimum AWG conductor.

I . Grounding Bus Bars: Provide at building electrical service entrance and at all telecommunication terminal boards. Install 12 inches above floor unless otherwise indicated.

J . Additional Electrodes: Where maximum resistance to ground is specified, provide additional driven electrodes as needed to meet specified requirements or provide one electro-chemical ground rod set in 6 inch diameter bored hole backfilled with bentonite clay. Provide handhole for inspection access and 15 feet minimum separation from other electrodes.

3.2 TESTS

A . Service Entrance Ground Electrode System: ANSI/IEEE 81; measure and record ohmic value by performing fall of potential tests using a ground testing megger. Tests shall be performed with the ground electrode system disconnected/isolated from neutral and with the test current probe located at least 100 feet from the nearest ground system electrode.

B . Maximum Acceptable Resistance to Ground: 25 ohms.

END OF SECTION

SECTION 260580 – UTILITY SERVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A . Drawings and general provisions of the Contract, including General Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.

1.2 SECTION INCLUDES

A . Electrical Service Requirements.

1.3 REGULATORY REQUIREMENTS

A . Contact and coordinate with Puget Sound Energy regarding electrical service requirements, including entrance fittings, meter enclosures and socket arrangement, and current transformer provisions.

B . Obtain, prepare, and file application forms required by the serving utilities for obtaining temporary and permanent services.

C . Do not install any equipment or service entrance rough-in prior to contact, coordination, and obtaining all requirements from the applicable serving utilities.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

A . Materials and Equipment: Conform to requirements of the Utility companies.

PART 3 - EXECUTION

3.1 INSTALLATION, ELECTRICAL SERVICE

A . Make arrangements with Utility Company to obtain permanent electrical service to the Project. Coordinate and arrange for scheduling of Utility Work.

B . Installation: Comply with Utility Company rules, regulations, and installation requirements.

C . Provide meter bases, and service entrance conduit and wire. Leave sufficient service conductor length at weatherhead for terminations by Utility.

END OF SECTION

SECTION 260920 – LIGHTING CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.

B. Section 265000 - Lighting Fixtures.

1.2 SECTION INCLUDES

A. Manual Controls.

B. Occupancy Sensors.

C. Daylight Sensors.

D. Room Controllers.

E. Factory Start Up Requirements.

1.3 SUBMITTALS

A. Submit product data for all products and associated components specified under Part 2 of this section.

B. Submit shop drawings showing control sequence, bill of material, and wiring or schematic diagrams for each type and variance of room lighting control system. Indicate by plan or instruction the best mounting and installation location for each occupancy and daylight sensor. For multi-room and networked control systems include additional shop drawings of floor plans that show location of panels, system components, and interconnecting wiring. Wiring diagrams shall clarify field installed from factory installed wiring.

1.4 OPERATION AND MAINTENANCE DATA

A. Include submittal data, shop drawings, installation and operating instructions, commissioning and test reports, and warranties that exceed one year in Operations and Maintenance Manuals.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A . 0-10 VDC Wall Box Dimmers: Lutron Diva series or approved.

B . Line Voltage Photocells: General Electric, Intermatic, Tork.

C . Occupancy Sensors: Greengate, Sensor Switch, WattStopper.

D . Digital Room Controllers, Sensors, and Wall Stations: LC&D, nLight, Wattstopper.

2.2 MANUAL CONTROLS

A . Line Voltage Switches: Provide as specified under Section 260500 for wiring devices.

B . Low Voltage Switches: Heavy duty, 3-position, momentary contact, toggle switch, rated 3 amperes at 25 VAC. Two wire, single relay control switches shall include integral diodes for transformer/relay operation as required. Color: Match wiring devices specified under Section 260500.

C . 0-10VDC Wall Box Dimmer: Architectural line voltage on/off switch with low voltage preset linear slide dimming control feature, 120/277 volt, 8 amp minimum switching load capacity, 50 milliamp minimum 0-10VDC sink capacity, UL listed for use with fixture type, driver, and/or dimming ballast provided, single pole or 3-way as indicated, suitable for use with decora style wall plates Color: Match wiring devices specified under Section 260500.

D . Digital Wall Stations: Low voltage, local network, manual switch station with feed thru RJ45 ports, suitable for use with decora style wall plates. Provide On/Off, On/Off/Dim, and/or multi-pushbutton On/Off/Scene/Dim switch stations as indicated. Color: Match wiring devices specified under Section 260500.

E . Switch Plates: Match material and finish of device plates specified in Section 260500.

2.3 OCCUPANCY SENSORS

A . Room Sensors:

1. Dual technology (ultrasonic/passive infrared) 24VDC occupancy detector, adjustable sensitivity and time delay, manual override, LED motion indicator, compatible with fluorescent electronic ballasts. Rated area coverage shall conform to manufacturer's recommendation for complete room coverage without gaps, using single or multiple sensors as required. Sensors may be wall or ceiling mounted type. Exception: In restrooms and toilets with privacy partitions or showers, provide ultrasonic type without passive infrared feature.
2. Provide low temperature sensors (-4 degree F/-20 degree C) where installed in unheated spaces and in refrigerated spaces. Provide high humidity sensors where installed in damp locations, refrigerated spaces, and adjacent to shower stalls.

B . Transformer/Relay Pack: 120/277 volt control interface providing NEC class 2 input/output to occupancy sensor(s) and automatic line voltage switch control. Relay contacts shall be isolated, normally open, rated 20 amperes for ballast loads and 1 HP. Provide auxiliary isolated dry contact set to allow for air temperature control (ATC) interface with the occupancy sensor control system; a slave relay may be provided for this purpose.

C . Wall Switch Sensors:

1. Passive infrared occupancy sensor, automatic OFF, manual ON/OFF, continuous self adapting sensitivity and time delay, LED motion indicator, compatible with magnetic ballast, electronic ballast, and motor loads, 170 degree minimum field of view. Minimum load rating shall be 600 VA and 1/6 HP at 120 volts and 1000 VA and 1/3 HP at 277 volts. Minimum rated area coverage shall be 900 square feet.
2. Provide low temperature sensors (-4 degree F/-20 degree C) where installed outdoors, in unheated spaces, and in refrigerated spaces. Provide high humidity sensors where installed in damp locations, refrigerated spaces, and adjacent to shower stalls.
3. Two Level Switching: Where indicated, provide wall switch sensor with independent dual switching control, user selectable for control of one or two switch legs to provide two levels of room illumination.
4. Finish: Match wiring devices and plates specified under Section 260500.

2.4 DAYLIGHT SENSORS

A . Indoor Digital Daylight Sensors: Multi-zone photo sensor with RJ45 network connection, infrared (IR) transceiver for calibration using a handheld remote programmer, and suitable for semi-flush ceiling mount or for surface mounting in skylight wells. Sensor measures room daylight contribution and communicates with a compatible room controller to automatically dim or switch up to three separate zones of lighting, raising and lowering light fixture illumination in response to available daylight.

B . Low Voltage Photo Sensors, Outdoors: Weather proof, water tight sensor head suitable for outdoor mounting to an outlet box, auto ranging 1 to 10,000 FC, + or - 5%, compatible with control panel controller for off-day/on-night operation of outdoor light fixtures.

C . Line Voltage Photocell: Weatherproof, off-day/on-night, 2000 watt tungsten rated, SPST with time delay, adjustable 2-50 footcandles.

D . Line Voltage Photocell, Flush Mounted: Weatherproof, off-day/on-night, button type, thermal relay, 1000 watt, SPST, with stainless steel cover plate and gasket.

2.5 DIGITAL ROOM CONTROLLERS

A . General: UL listed low voltage network lighting and power controller, 120/277 volt, 20 ampere rated, three (3) on/off relay outputs, four (4) minimum RJ45 digital input/outputs.

B . Dimming: Where manual and/or automatic daylight control is indicated, provide three (3) 0-10Volt DC Class 2 dimming control outputs. Controls shall be configured to completely shut off all controlled lights in the control zone.

C . On/Off Receptacle Load Control: Where automatic switch control of receptacles is indicated, provide a UL listed low voltage network 20 ampere plug load rated standalone controller [and/or wireless transmitter in combination with approved wireless receptacles].

D . Sensors, Devices, and Accessories: Provide compatible sensors, wall stations, interface device, and cabling for a complete control system.

E . Emergency Lighting: Controllers with dimming control shall be programmed or otherwise designed to ensure 100% full light output of controlled dimmable emergency lights upon loss of normal power.

F . Provide hand held wireless configuration device for remote programing of system sensor, control, and dimming functions. Furnish two ( ) hand held devices.

G . Provide required software and PC USB interface device for programming and managing the digital lighting control system using a personal computer.

2.6 EMERGENCY TRANSFER DEVICES

A . Integral with Light Fixture: Emergency transfer devices installed in light fixtures are specified under Section 26 50 00, Light Fixtures.

2.7 MATERIALS

A . A. Low Voltage Wire: UL Type CL2P, NEC class 2P or better, with teflon jacket overall and listed for use in ducts, plenums, and other air handling spaces; multi-conductor, stranded copper cable, #20 AWG minimum, color coded.

B . RS 485 Communications and Digital Control: UL type CMP, Category 6 extended frequency (350MHz), 24 AWG solid copper, 4-pair unshielded twisted pair, jacket overall, color coded, listed for use in ducts, plenums, and other air handling spaces. Cable installed below grade shall have a water blocking core and be suitable for wet locations in conduit.

C . Conduit and Outlet Boxes: As specified under Section 260500.

PART 3 - EXECUTION

3.1 INSTALLATION

A . Install lighting controls in accordance with manufacturer's instructions and approved shop drawings. Provide programming, setup, and calibration for complete operation of each control system.

B . Install low voltage wiring in conduit.

3.2 OCCUPANCY SENSORS

A . Room Sensors: Provide number and location required for complete coverage within room (including toilet and shower stalls) and to minimize false activation thru open doors as recommended by manufacturer. Ceiling mounted sensors shall not be used above 12 feet. Provide additional transformer/relays or room controllers as required where multiple branch circuits are controlled.

B . On/Off Operation: Wall switches and occupancy sensors shall be wired or otherwise programmed to provide manual on, manual off, and automatic sensor off control of room lighting unless otherwise indicated.

C . Time Delay: Set manual time delay for automatic off at 15 minutes unless otherwise directed or indicated.

3.3 DAYLIGHT SENSORS

A . Locate daylight sensors per plan and/or instructions shown on approved shop drawing.

B . Provide calibration of daylight sensing controls after substantial completion. Calibrate indoor daylight sensors to lower fixture illumination when daylight zone ambient illumination is above 80FC unless otherwise indicated.

3.4 DIGITAL ROOM CONTROLLERS

A . Areas with Accessible Ceiling Space: Locate controller above ceiling within 6 feet of first lighting outlet serving lights to be controlled unless otherwise indicated. Low voltage wiring between sensor and relay may be installed without conduit.

B . Coordinate with Division 25 contractor to identify auxiliary relay contacts provided for air temperature control (ATC) interface.

3.5 FACTORY STARTUP

A . General: Field start-up, testing, and adjustment for low voltage control panels and for digital room control systems shall be performed under the supervision of a factory trained manufacturer's representative.

3.6 DEMONSTRATION AND INSTRUCTIONS

A . Demonstrate operation and maintenance of system to Owner's personnel prior to contract closeout. Allow one site visit and two hours of total instruction scheduled at convenience of Owner.

B . Use operation and maintenance manuals as basis of instruction, reviewing contents of manual with personnel in detail.

C . Follow-Up Training: Include a second site visit for training and programming adjustments between 6 months to one year of substantial completion scheduled at convenience of Owner.

END OF SECTION

SECTION 262000 – ELECTRICAL DISTRIBUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A . Drawings and general provisions of the Contract, including General Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.

1.2 SECTION INCLUDES

A . Panelboards and Circuit Breakers.

B . Disconnect Switches.

C . Fuses.

D . Nameplates.

E . Compression Lugs.

1.3 SUBMITTALS

A . Submit product data for switchboards, panelboards, circuit breakers, motor controllers, contactors, dry type transformers, busway, and enclosed circuit breakers. Dry type transformer submittal must indicate compliance with minimum efficiency requirements specified.

B . Submit shop drawings for switchboards, panelboards, busway, and dry type transformers. Include installation requirements for anchoring and bracing meeting requirements of the International Building Code for Seismic Design Category F.

C . Coordinate dimensions of equipment with site and project space dimensions to verify equipment will fit, conform to indicated layout, and meet NEC and manufacturer clearance requirements.

D . Submit reports for tests required under Part 3 of this section. Submit manufacturer’s performance testing instructions and signed written performance test records for equipment ground fault protection systems.

E . Submit product data and shop drawings for service switchboard to serving utility for review and approval in addition to Architect/Engineer submittal requirements.

F . Submit short circuit, protective device coordination, and arc flash hazard study. Study shall be submitted prior to or at the same time as distribution equipment. Distribution equipment shall not be ordered without prior approval before the study submittal is reviewed.

1.4 OPERATION AND MAINTENANCE DATA

A . Include data for panelboards, circuit breakers, motor controllers, transformers, fuses, contactors, busway, studies, and tests in Operation & Maintenance Manuals.

1.5 SPARE PARTS

A . Fuses: Furnish to Owner 3 spare fuses of each type and rating installed.

B . Fuse Pullers: Furnish 2 fuse pullers to the Owner.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A . Switchboards, Panelboards, Circuit Breakers and Disconnects: Square 'D', Siemens, Cutler-Hammer, General Electric - ABB.

B . Motor Controllers and Contactors: Allen-Bradley, Square 'D', General Electric - ABB, Furnas, Cutler-Hammer.

C . Fuses: Bussman and Littelfuse.

D . Busway: Square 'D', General Electric - ABB, Siemens, Cutler-Hammer.

2.2 BRANCH CIRCUIT PANELBOARDS

A . Panelboards: UL 67, NEMA PB 1; bolt-on circuit breaker type.

B . Electrical Ratings, Circuit Breaker Arrangement, Special Features: As indicated on drawings. Indicated ampere interrupting capacity (AIC) is the rms symmetrical integrated equipment short circuit rating of the complete assembly. Indicated AIC rating shall be base upon manufacture listed series rating with the panelboard main device or the line side overcurrent protective device, as applicable, unless otherwise indicated.

C . Cabinet: Concealed trim clamps, concealed hinge lockable door-in-door (one lockable latched door over interior and one lockable latched door which exposes gutter) with flush locks all keyed alike, 6" deep x 20" wide. Provide two keys for each panelboard furnished.

D . Finish: Manufacturer's standard enamel over rust inhibitor for exposed surfaces; galvanized steel for recessed boxes.

E . Circuit Directory: Index card under plastic with metal framed holder on inside door.

F . Main Overcurrent Protective Device(s): UL 489; molded case circuit breaker with thermal magnetic trip fixed mounted, single handle common pole operation, AIC rating greater than available symmetrical short circuit amperes. Main circuit breakers required to selectively coordinate shall have LI or LSI solid state trip.

G . Circuit Breakers: UL 489; molded case, thermal magnetic trip. Multi-pole breakers shall be single handle with common pole operation.

1. Provide type SWD circuit breakers for lighting circuits.
2. Provide type HACR circuit breakers for air conditioning equipment, refrigeration equipment, and surge protection devices (SPD).
3. Provide approved manufacturer handle ties between single pole circuit breakers serving branch circuits sharing a common neutral (disconnecting means for multiwire branch circuits).
4. Provide approved manufacturer handle padlock attachment on circuit breakers serving branch circuits for permanently connected appliances without local disconnecting means and where otherwise indicated.
5. Provide combination-type arc-fault circuit interrupter protection (AFCI) circuit breakers for branch circuits where indicated.
6. Provide ground fault circuit interrupter protection (GFCI) circuit breakers for branch circuits where indicated.
7. Provide ground fault equipment protection (GFEP) circuit breakers for pipe heat trace and for deicing and snow melting equipment.
8. Circuit breakers used as mains (back-fed) shall be suitable for the purpose and shall include an auxiliary fastener listed and approved by the panelboard manufacturer where plug-in type device is used.

H . Bussing: Copper with full neutral and ground bus. Provide separate ground bus isolated from cabinet where isolated grounding requirements are indicated.

I . Where surge protective device (SPD) is indicated, coordinate requirements with Section 26 43 00.

J . Where fusing is required to comply with selective coordination requirements of NEC 700 and 701, provide lighting and appliance panelboard that includes UL listed, special purpose, low peak branch circuit fuses with Class J performance in series with each branch circuit breaker or disconnect. Fuses shall be IP20 finger-safe with neon open fuse indication, single and multi-pole as scheduled. Cooper Bussmann QSCP, Eaton PRL1aF or 2aF, or approved.

K . Provide flush mounted panelboards with bullnose trim where full recessed depth is not available.

L . Provide sheet metal skirt with matching panelboard finish from bottom of surface mounted panelboards to floor.

2.3 DISCONNECT SWITCHES

A . Safety Switches: NEMA KS 1; heavy duty, quick make, quick break, handle with lock out / tag out provisions. Provide rating, number of poles, and fusing required for load served.

B . Safety Switches for Variable Frequency Drives (VFD): Safety switches installed on the load side of VFD controllers shall include an interlock to disable controller operation when the safety switch handle is operated to the open positon.

C . Toggle Switches for Small Motors and Appliances: NEMA WD 1; horsepower rated 20 ampere general use snap switch with lock-out attachment.

D . Switch Enclosures: NEMA ICS 6; Type 1 for dry locations, Type 3R for damp or outdoor locations.

2.4 FUSES

A . Approved Fuses, 600 Amperes and Less, for Branch Circuits and Power Distribution:

1. ANSI/UL 198C Class J low peak with time delay unless otherwise indicated except ANSI/UL 198E Class RK5 may be used in safety switches for protection of motors and transformers.

2. For Protection of Circuit Breakers: Fuses must comply with NEC 240.86 series rating requirements for load side circuit breakers that are not rated for the available fault current. Coordinate series rating requirements with published manufacturer's listings for circuit breakers installed.

2.5 NAMEPLATES AND LABELS

A . Nameplates: Engraved three-layer laminated plastic, white letters on black background, affixed with stainless steel screws, adhesive acceptable in dry locations. Use black letters on yellow background for series combination rating identification.

B . Letter Height: 1/2 inch for series combination rating identification. 1/4 inch for switchboards, panelboards, motor control centers, circuit breakers, switches, and disconnecting means; 1/8 inch for motor starters, contactors, time switches, and equipment served.

C . Arc Flash Hazard Warning at Service Equipment Rated 1200 Amps and Larger: ANSI Z535.4; Self adhesive vinyl label factory installed by the equipment manufacturer to read WARNING, Electrical Arc Flash Hazard, Appropriate PPE Required, and informational text to indicate system voltage, available fault current at the service overcurrent protective devices, clearing time of service overcurrent protective devices based on the available fault current, and date the label was applied.

D . Arc Flash Protection Labels: ANSI Z535.4; Self adhesive vinyl label factory installed by the equipment manufacturer with ANSI header to read WARNING or DANGER and informational text to include:

Electric Arc Flash Hazard
Turn off all power before opening.
Follow all requirements in NFPA 70E for safe work practices and for Personal Protective Equipment.
Failure to comply can result in death or injury.

E . Arc Flash Protection Labels for Switchgear, Panelboards, and Motor Control Centers: ANSI Z535.4, NFPA 70E; Self adhesive vinyl labels consisting of arc flash information based on the approved hazard study. Labels shall include Flash Category, Arc Flash Rating (cal/cm^2), Hazard Boundary, and required Personal Protective Equipment (PPE). Provide additional labels for system when in reduced maintenance mode.

2.6 COMPRESSION LUGS (ALUMINUM CONDUCTOR)

A . Where aluminum conductor is substituted for copper conductor under Section 260500, compression lugs shall be provided in lieu of mechanical lugs for terminating conductors.

PART 3 - EXECUTION

3.1 PANELBOARDS

A . Install in accordance with NEMA PB 1.1.

B . Height: 78 inches maximum measured from finish floor to top of enclosure; 78 inches maximum measured from finish floor to highest device handle for panelboards over 66 inches high.

C . Provide typewritten circuit directory for each panelboard listing load description for each circuit. Use final room names and numbers as verified with the Owner.

D . Stub 3 empty 3/4-inch conduits to accessible location above ceiling from each recessed panelboard.

E . Fire Rated Construction: Recessed rough-in cans that penetrate fire rated wall assemblies shall comply with requirements of Section 260500. Verify location of fire rated assemblies with Architectural plans prior to rough in.

3.2 DISCONNECTS

A . Provide a disconnect in addition to the controller disconnecting means at installed motor loads that are not in sight of motor controller as required by NEC 430.102(B).

B . Safety Switches for Variable Frequency Drives (VFD): Provide two (2) #12 600 volt rated conductors with the motor feeder between VFD and load side motor disconnect interlock to disable controller operation when the safety switch handle is operated to the open position.

3.3 FUSES

A . Install fuses in fusible switches.

B . Size fuses for motor loads at 150% of nameplate full load amperes; size fuses for air conditioning and refrigeration equipment at maximum recommended nameplate rating.

3.4 CIRCUIT BREAKERS

A . Install circuit breakers in accordance with manufacturer instructions and recommendations.

B . Set adjustable breakers to comply with the approved protective device coordination study or as directed by the Engineer.

3.5 NAMEPLATES AND LABELS

A . Panelboards: Provide nameplate to identify equipment designation, voltage, and source of supply for each, e.g. Panel A, 208/120V, Fed from Panel M. Provide arc flash protection label. Provide series combination rating nameplate where such rating is applicable.

B . Individual Circuit Breakers, Switches, and Motor Starters Installed in Switchboards, Distribution Panelboards Without Circuit Index: Provide nameplate to identify circuit source, circuit number, and load served.

C . Individual Enclosed Circuit Breakers, Safety Switches, and Disconnecting Means: Provide nameplate to identify load served and circuit source and circuit number.

D . Equipment Served: Provide nameplate to identify equipment designation corresponding with nameplate of serving overcurrent device, disconnect switch, or controller when there is more than one of same type of equipment being served, e.g. Air Handler No. 2. Coordinate with Architect/Engineer to assign numbers when not designated in equipment schedules.

E . Nameplate and Label Location: Secure to equipment fronts, except recessed panelboards in finished locations secure nameplates and labels to inside face of door.

F . Service Equipment: Provide label identifying short circuit rating indicated along with date of construction documents.

3.6 TESTS

A . Motors and Compressors: Record all nameplate data. Measure actual voltage and running amperes for each phase. Record manufacturer and catalog number of overload thermal units installed.

END OF SECTION

SECTION 262729 - ELECTRIC VEHICLE CHARGING STATION

PART 1 - GENERAL

1.1 SUBMITTALS

A. Submit accordance with Section 01 33 00.

B. Product and Installation Data:

C. Shop Drawings:

1. Submit drawings indicating fabrication and installation requirements, indicating anchorage and accessory items.

1.2 QUALITY ASSURANCE

A. Manufacturer Qualifications:

1. Five (5) years (min) experience in the production of EV Charging Station system installation.

B. Installer Qualifications:

1. Three (3) years (min) experience with EV Charging Station system installation

1.3 DELIVERY, STORAGE, AND HANDLING

A. In accordance with Section 01 60 00 and the following:

1. Acceptance at Site:

a. Verify undamaged condition.

2. Protection (prior to installation):

a. Store out of harm's way.

3. Handle to prevent marring finishes.

1.4 SEQUENCING/SCHEDULING

A. Phase in properly with Construction Schedule per Section 01 33 00.

1.5 WARRANTY

A. Provide manufacturers standard warranty.

1.6 COLORS

A. Colors are specified on Colors and Materials Schedule on drawings.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: Chargepoint CT4021-GW1, Dual Port Bollard Mount, CT400 series with Power Management Kit Bollard, Concrete Mounting.

B. PowerCharger Commercial Energy Series 40A, Dual Pedestal.

C. Siemens.

D. Substitution: Under provisions of Section 01 60 00.

2.2 EV CHARGING STATION – LEVEL II

A. General: UL listed, NEMA 3R, free standing, anchor base, SAE J1772 Level II, outdoor electrical vehicle conductive charging station, suitable for both commercial and secured public access. Configurable via Bluetooth device.

B. Level II Rating: 208/240 volt, single phase, 6.7/7.7 KVA, 32 amp maximum load current.

C. Output Charging Connector: SAE J1772 Level II connector on 23 foot Type EV cable. Provide integrated locking holster for parking the connector.

D. Ground Fault Protection: Include integrated GFCI with self-test and auto retry.

E. Surge Protection: Include AC surge protective device. As a minimum, device shall protect on board equipment and electronics from an ANSI/IEEE C62.41.2 Category B (6KV/3kA) ring wave.

F. Integrated Operating Features: Include power metering, RFID reader, remote diagnostics and control capability, and alarm/notification for ground fault, overcurrent, removed connector plug, and charging complete.

G. Wireless Network Interface: Provide integral CDMA gateway modem.

H. Housing: NEMA ICS 6; Type 3R or better for outdoor locations. Housing color as selected from manufacturer standard available colors and finishes.

I.

2.3 ELECTRIC VEHICLE CHARGING RECEPTACLE

A. Rated 40 amps at 208 Volt single-phase

PART 3 - EXECUTION

3.1 INSPECTION

A. Verify installation conditions as satisfactory to receive work of this Section. Do not install until any unsatisfactory conditions are corrected. Beginning work constitutes acceptance of conditions as satisfactory.

3.2 INSTALLATION

A. Install in accordance with specifications and manufacturer's Instructions. Where these may be in conflict, the more stringent requirements apply.

B. Erect partitions plumb, rigid, properly aligned and securely fastened in place, complying with approved shop drawings.

C. Equipment Pad: Provide 24 inches square x 36 inches deep, concrete anchor base for free standing installation. Install pad flush with hard surface finish grade except in landscape or unfinished areas set 2-inch above final grade. Provide 1/2-inch chamfer on all exposed edges above grade.

D. Demonstrate operation, maintenance and programming of system to Owner’s personnel prior to Contract Closeout. Allow one two hour session scheduled at convenience of Owner. Review contents of manual(s) in detail to explain all aspects of operation and maintenance.

3.3 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 26 50 00 – LIGHTING FIXTURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A . Drawings and general provisions of the Contract, including General Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.

B . Section 260100 – Electrical General Requirements.

C . Section 260500 – Basic Materials and Methods.

D . Section 260920 – Lighting Controls.

1.2 SECTION INCLUDES

A . Interior Luminaires and Accessories.

B . Exterior Luminaires and Accessories.

C . Lamps.

D . Ballasts and LED Drivers.

E . Emergency Lighting Equipment.

1.3 COORDINATION

A . Confirm luminaire type, mounting, and recessed depth is compatible with ceiling system prior to ordering. Coordinate with architectural reflected ceiling plans, sections, and details.

B . Determine final luminaire locations according to architectural reflected ceiling plans and elevations. In spaces open to structure, coordinate final luminaire locations and mounting heights with ductwork, piping, and structural members and submit final plan to Architect/Engineer for approval.

C . Coordinate dimensions and mounting of under-cabinet and other casework lighting with the cabinet and/or casework product vendor(s) prior to ordering light fixtures.

D . Coordinate control protocol for all drivers and low voltage transformers with Section 260920 control products.

1.4 SUBMITTALS

A . Submit product data for all items specified under Part 2 of this section and scheduled on the drawings. Include in submittal and in Operations and Maintenance Manual a coversheet listing each fixture type with corresponding LED/lamp and driver/ballast data.

B . Submit shop drawings for low voltage lighting systems.

1.5 OPERATION AND MAINTENANCE DATA AND TRAINING

A . Submit all data in Operation and Maintenance Manuals.

B . Provide onsite training on driver and LED board replacement for each type of luminaire installed.

C . Include documentation from system start up.

1.6 WARRANTY

A . LED Luminaires and Fixture Ballasts: Provide minimum five year comprehensive warranty.

1.7 EXTRA STOCK

A . Luminaires: Provide extra stock under provisions of Section.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A . Luminaires and Accessories: Identified in Fixture Schedule.

2.2 LED LUMINAIRES

A . Indoor luminaires shall comply with following requirements unless otherwise scheduled on the drawings: UL listed, Reduction of Hazardous Substance (ROHS) compliant, 3500K color temperature, 80 CRI minimum, listed for 25 degree C minimum ambient operation, integral driver, integral surge, open circuit, short circuit, and overload protection, L70 at 50,000 hours or better per IESNA LM-80. Provide dimmable driver for low voltage 0-10 volt control to 10% of lumen output except dimming drivers that have daylight responsive control shall dim to completely OFF.

B . Outdoor luminaires shall comply with following requirements unless otherwise scheduled on the drawings: UL listed, Reduction of Hazardous Substance (ROHS) compliant, IP66 rated, 3000K color temperature, 70 CRI minimum, listed for -20 degree C to 40 degree C ambient or better operation, integral driver, integral surge, open circuit, short circuit, and overload

protection, rated L70 at 50,000 hours or better per IESNA LM-80. Provide dimmable driver suitable for 0-10 volt control.

C . Recessed LED luminaires shall have drivers, modules, and reflectors accessible, serviceable, and replaceable from below the ceiling.

2.3 FIXTURE WHIPS

A . 3/8 inch flexible conduit or approved MC cable assembly with circuit and equipment ground conductors; 72 inch maximum length.

B . Where fixtures are provided with pre-installed whips, verify wiring arrangement, termination location, and installation clearances prior to ordering.

2.4 FIXTURE ACCESSORIES

A . Provide necessary hangers, brackets, plates, anchors, and other mounting accessories required by construction features and ceiling conditions. Comply with requirements of Section 260500 - Basic Materials and Methods.

B . Pendants: Provide single pipe stem type with self-aligning swivel hangar and canopy and suitable for sloped ceilings, stem length as required.

C . Allow sufficient length for pendants, cables, chains, conduit, or rods as specified to install hanging fixtures at 8 feet above finished floor or 36 inches below the ceiling, whichever is lower, unless otherwise indicated in the construction documents.

D . Low Voltage Luminaires: Provide transformers, power supplies, cabling and mounting hardware as required for complete operating system. Verify cabling lengths prior to ordering.

2.5 LIGHTING FIXTURE SCHEDULE

A . See Drawings.

PART 3 - EXECUTION

3.1 INSTALLATION

A . Provide LED modules/lamps in luminaires provided under this Section.

B . Provide wiring, installation, and lamps for lighting fixtures furnished under other Sections or by Owner, including fixtures furnished as part of hoods and equipment (e.g. range hoods, kitchen hoods, fume hoods, and walk-in HVAC equipment). Incandescent lamps shall be maximum listed wattage of fixture except when smaller wattage is indicated.

C . Set lighting fixtures plumb, square, and level; measure mounting heights to center of fixture for wall mounted and to bottom of fixture for pendant hung.

D . Support lighting fixtures from building structural members; provide metal channels or additional blocking and framing as required for fixture support between structural members or to avoid interference from mechanical pipes and ducts. Conceal supports within building construction in finished spaces.

E . Recessed and surface mounted lighting fixtures weighing less than 56 lbs (25.4 kg) may be supported from metal ceiling suspension systems when auxiliary support from structural members using two #12 AWG wire hangers at diagonal corners are provided (hangers may be slack). Fixtures weighing 56 lbs or more must be supported directly from the structure by approved hangers.

F . Light fixtures hung below suspended ceilings by pendants, cables, chains, conduit, rods, or other means shall be supported from structure above using #9 AWG wire hanger or alternate support approved by Inspection Authorities.

G . Securely fasten recessed and surface fixtures in place; provide seismic clips (one each corner) for lay-in fixtures; attach surface fixtures tight to ceilings and walls, and secure fluorescent fixtures within 12 inches of each end.

H . Mounting height for wall mounted fixtures and for hanging fixtures supported by pendants, cable, chain, conduit, rods, or other means shall be determined by the architect/engineer during construction unless otherwise indicated in the construction documents.

I . Install suspended fixtures so that no obstruction is located within the swing range. Pendants, rods, chains, or cables 48 inches and longer shall be braced to prevent swaying. In finished spaces, use stainless steel aircraft cable for sway bracing. Single stem fixtures shall be braced with cables installed 120 degrees apart. Fixtures and fixture assemblies with two or more supports shall be braced with two cables separated 120 degrees apart and attached to the suspension yoke or bracket located at each end of the fixture or assembly (4 cables total). Single stem fixtures shall be braced with stainless steel aircraft cable stretched taut across the room and attached to fixture stem using a suitable stainless steel shackle and cable clamp.

J . Coordinate display and specialty lighting installation with Architectural drawings. Verify location for transformers, power supplies and exposed cabling.

3.2 FIXTURE FAILURES

A . Replace luminaires which have failed drivers or LED boards at completion of work.

3.3 ADJUSTING AND CLEANING

A . Align and tighten luminaires and clean reflectors, lenses and diffusers at completion of work. Clean paint splatters, dirt, and debris from installed luminaires.

B . Make final aiming adjustment of directional luminaires as directed by Architect/Engineer at completion of work.

3.4 EMERGENCY LIGHTING EQUIPMENT

A . Exit, Self-Contained Emergency, Night lights: Connect ahead of switch control on local lighting circuit.

3.5 FIRE RATED CONSTRUCTION

A . Recessed Luminaires: Provide field fabricated fire resistive shell acceptable to Fire Marshal and conforming to requirements of UL assembly rating for ceiling installed. Allow clearances around fixture for adequate ventilation per fixture manufacturers recommendations and UL listing.

3.6 THERMAL AND SOUND INSULATION

A . Coordinate with General Contractor to ensure provisions are made to support insulation materials minimum of 3 inches clear of recessed lighting fixtures that are not IC rated.

3.7 TRAINING

A . Coordinate with Architect to arrange onsite training for luminaire and lighting inverters. Allow 20 minutes per each type of installed luminaire to review driver and LED board replacement. Allow four hours of factory training for the lighting inverters.

END OF SECTION

SECTION 311000 -SITE CLEARING

PART 1 - GENERAL

1.1 **PERMITS**

A. All permits and fees are to be obtained or scheduled by the Contractor at his expense.

1.2 **REFERENCES**

A. Reference standards listed below:

1. WSDOT - APWA (latest edition) Standard Specifications for Road, Bridge and Municipal Construction (not including measurement and payment provisions)

2. WSDOT - APWA Standard Plans for Road, Bridge and Municipal Construction

1.3 **SUBMITTALS**

A. Submit in accordance with Section 01 33 00. Permits for transport and disposal of debris as required by the authority having jurisdiction.

B. In accordance with Section 01 77 00, submit record drawings indicating locations of remaining utility lines and related appurtenances.

1.4 **QUALITY ASSURANCE**

A. All work shall be in accordance with the WSDOT-APWA Standard Plans for Road, Bridge and Municipal Construction, including the APWA supplements, unless modified herein or on the Drawings.

B. The Contractor shall remove surface and/or unsuitable material at locations designated by the geotechnical Engineer and provide such assistance as necessary for sampling and testing.

1.5 **EXISTING CONDITIONS**

A. Coordinate protection of existing trees and vegetation to remain with General Conditions.

B. It shall be the Contractor's responsibility to photograph all areas of the site that he will occupy or use during the course of construction for the purpose of determining the level of restoration required to return all landscaping to the same condition as prior to the start of construction. The Contractor shall coordinate with the Owner for extent of areas to

photograph and then provide one (1) set of photographs to the Owner prior to beginning any work on site.

C. Protection of Existing Improvements: In accordance with Section 01 50 00, General Conditions, and the following:

1. Provide, erect, and maintain barricades, coverings, or other types of protection necessary to prevent damage to existing improvements indicated to remain in place. Restore any improvements damaged by this Work to their original condition, as acceptable to Owner.

D. Contact utility companies and request meter readings, utility cutoffs, and meter and line removals. Verify that all appropriate services have been disconnected. Contractor shall pay for all fees and costs associated with utility disconnect, capping, line and meter removals.

E. Do not shut off or cap utilities without prior notice to utility and Owner. Coordinate work with Division 1 requirements. Maintain street drains and sewers open for free drainage:

1. Provide filter fabric at catch basins.

F. Objectionable Noises: Limit use of air hammers and other noisy equipment as much as possible. Conform to local agency requirements regarding Noise Control.

G. Maintain vehicular and pedestrian traffic routes:

1. Ensure minimum interference with roads, streets, sidewalks, and adjacent facilities.

2. Do not close or obstruct streets, sidewalks, or paved pathways without permission from authorities having jurisdiction.

3. If required by governing authorities, provide alternate routes around closed or obstructed traffic ways.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify clearing and grubbing and site improvement removal may safely and appropriately

begin.

B. Obtain required permits and permission from local governing authorities and Owner prior to commencing Work.

C. Establish Limits of Clearing and existing tree protection required.

3.2 CLEARING

A. Remove growth, paving, etc., as required for new construction and as indicated. Removal operations shall be performed in a manner to protect property and trees to remain.

1. Completely remove all trees indicated for removal on the plans and other vegetation and organic material within Work areas.

2. Cut down and move to designated stockpile site those trees identified by Owner for removal from stockpile site by others. Move cut trees in their entirety. Following removal of major tree sections by others, completely remove debris remaining at stockpile site under this Contract.

3. Make a vertical saw cut between any existing pavement that is to remain and the portion to be removed.

4. Replace, at Contractor's expense, any existing pavement designated to remain that is damaged during the removal of other pavement.

3.3 GRUBBING AND STRIPPING

A. General: Grub or otherwise prepare areas where clearing has occurred to receive construction or other improvements.

1. Excavate and remove all stumps.

2. Excavate and remove roots larger than 1-1/2 in. in diameter, rocks and boulders 4-in. diameter or larger, any remaining paving.

3. Strip and remove all sod, roots, topsoil and other unsuitable soils under buildings and paved areas and walkways. For Bid purposes, assume stripping of 6-in. depth of unsuitable soil under building, all paved areas including fire lane and all exterior slabs and walkways.

4. Take precautions to drain all grubbed and stripped areas to prevent soils from becoming too wet for proper compaction.

3.4 EROSION CONTROL

A. Contractor shall provide erosion and sedimentation control facilities as shown to prevent erosion and stop sediment-laden waters from leaving the site. These plans are the minimum required. The Contractor shall provide and maintain additional erosion and sedimentation control facilities required by Jurisdiction at no additional cost. All costs of

erosion and sedimentation control shall be incidental to the Work.

3.5 DISPOSAL OF MATERIALS

A. Stripped soils may be conditioned and reused as topsoil on site or disposed of at a permitted site off the Owner's property selected by the Contractor.

B. The refuse resulting from clearing, grubbing, and stripping shall be disposed of by the Contractor at his expense in a manner consistent with all government regulations at a site off the Owner's property. Maintain hauling routes clean and free of any debris resulting from work of this Section.

END OF SECTION

SECTION 312000 -EARTH MOVING

PART 1 - GENERAL

1.1 **WORK INCLUDED**

A. Provide excavation, subgrade preparation, fill, compaction, and site grading for paved areas, structures, and landscaped areas. Placement of planting media is not included in this Section. Rough grading and all fine grading to complete this project are included in this specification.

1.2 **REFERENCES**

A. AASHTO T180 - Moisture-Density Relations of Soils Using a 10 lb (4.54 kg) Rammer and an 18 in. (457 mm) Drop.

B. WSDOT-APWA – (latest eidition) Standard Specifications for Road, Bridge, and Municipal Construction (not including measurement and payment provisions).

C. WSDOT-APWA - Standard Plans for Road, Bridge and Municipal Construction.

D. ASTM C136 - Method For Sieve Analysis of Fine and Coarse Aggregates.

E. ASTM D698 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5 lb (2.49 Kg) Rammer and 12 in. (304.8 mm) Drop.

F. ASTM D1556 - Test Method for Density of Soil in Place by the Sand-Cone Method.

G. ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb (4.54 Kg) Rammer and 18 in. (457 mm) Drop.

1.3 **QUALITY ASSURANCE**

A. All work shall be in accordance with the WSDOT-APWA Standard Specifications for Road, Bridge and Municipal Construction, including APWA supplements, unless modified herein or on the drawings.

B. Testing:

1. Notify Architect and Soils Engineer a minimum of forty-eight (48) hours prior to proof-rolling of subgrade for evaluation of subgrades by the Soils Engineer.

2. Testing of compacted subgrade and fill materials will be performed by an independent testing laboratory appointed and paid for by the Owner. Testing will be performed so as to least encumber the performance of Work.

3. The Owner will pay for the cost of one (1) series of tests only, on the area being evaluated. Contractor shall pay for costs of additional site visits and testing required due to improper performance and scheduling of Work.

4. When Work of this Section or portions of Work are completed, notify the testing laboratory to perform density tests.

5. If during progress of Work, tests indicate that compacted materials do not meet specified requirements, remove defective Work, replace, and retest at no cost to Owner.

6. Ensure compacted fills are tested before proceeding with placement of surface materials.

1.4 SUBMITTALS

A. Submit samples and test results for acceptance of imported materials to Architect.

B. Test Results: Test results for "in place" materials shall be sent directly, by the Owner's testing laboratory, to the Engineer and the Architect.

1.5 IMPORTED MATERIAL ACCEPTANCE

A. All imported materials specified in this Section are subject to the following requirements.

1. All work necessary for the Contractor to locate an acceptable source of imported material shall be made by the Contractor.

2. Owner will provide commercial testing laboratory for certification as to whether the material conforms to the Specification or not.

3. Requests by Contractor for testing shall be submitted to the Owner at least five (5) days before the material is required for use.

4. All material samples shall be furnished by the Contractor at the Contractor's sole expense. Samples shall be representative and clearly marked to show the source of the material and the intended use on the project. Sampling of the material source shall be done by the Contractor in accordance with ASTM D75.

5. Notify the Engineer at least twenty-four (24) hours prior to sampling. The Engineer may, at the Engineer's option, observe the sampling procedures. Tentative acceptance of the material source shall be based on an inspection of the source by the Owner's testing laboratory personnel.

6. No imported materials shall be delivered to the site until the proposed source and materials tests have been accepted in writing by the Owner's Testing Laboratory.

7. Final acceptance on site will be based on tests made on samples of material taken from the completed and compacted course. The completed course is defined as a course or layer that is ready for the next layer or the next phase of construction.

B. If tests indicate that the material does not meet Specification requirements, material placement will be terminated until corrective measures are taken. Material that does not conform to the Specification requirements and is placed in the Work shall be removed and replaced at the Contractor's sole expense.

1.6 SITE COMPACTION TESTING

A. Testing:

1. Testing of compacted fill materials will be performed by an independent testing laboratory appointed and paid for by the Owner. Testing will be performed so as to least encumber the performance of Work. Notify Owner's Testing Laboratory forty-eight (48) hours before testing is needed.

2. When Work of this Section or portions of Work are completed, notify the Owner's Testing Laboratory to perform density tests.

3. If, during progress of Work, tests indicate that compacted materials do not meet specified requirements, remove defective work, replace and retest at no cost to Owner.

4. Tests will be taken by the Owner's Testing Laboratory as often as needed to certify the Contractor's work. Any work or materials later discovered to be defective shall remain the Contractor's responsibility whether or not the Owner's Testing Laboratory has tested the area.

1.7 SUBSURFACE SOILS DATA

A. Subsurface soils data is available from Owner upon request. Owner, Architect, and Engineer are not responsible as to its accuracy or completeness or for any additional compensation for work performed under the Contract due to assumptions based on use of such reviewed information.

1.8 DIMENSIONS AND LAYOUTS

A. The Contractor will be responsible for furnishing, setting, and marking all line, grade, and location stakes, including offsets and general construction staking.

B. There shall be on site at all times when Work requiring control is being performed all necessary equipment, supplies, and instruments related thereto. A qualified layout engineer, or licensed surveyor must be assigned to the Contractor's crew for this Work. This equipment and personnel must be available at no additional cost to the Owner for the purpose of verifying layout and certifying the accuracy of Work placement and grading on the site.

C. The Contractor is responsible for preserving all benchmarks and stakes and the replacement of any that are displaced or missing.

PART 2 - PRODUCTS

2.1 STRUCTURAL FILL

A. All fill placed under or around walls, under slab-on-grade floor, roadways, parking lots, sidewalks, and on-grade ramps and stairs, for all other paved areas, and for backfill of utility trenches shall be "structural fill" as defined herein.

B. Structural fill shall be imported clean granular fill or on-site material that has been accepted by the Soils Engineer for use as structural fill.

1. Imported structural fill shall consist of well-graded sand and gravel materials free of organic material, debris, and other deleterious material, and shall conform to the following gradation requirements:

Standard Sieve Size	Percent Passing by Dry Weight
Inch	100
No. 4	25 - 75
No. 200	5 maximum of that portion passing the 3/4 in. sieve.

2. On-site material used for structural fill shall be the non-organic site fill soils, which shall consist of primarily silty sands, free of organic and other deleterious materials, shall contain no particle greater than 6 in., and is suitable for use only in the dry summer months. Prior to placement as fill, this material shall be excavated and processed by cleaning, aeration, and drying as required by the Soils Engineer, who shall periodically observe and make recommendations regarding the excavation and fill work.

C. Structural Fill Under Slab: Fill material placed below the capillary break may be imported granular fill or, provided that soil moisture can be reduced and maintained near optimum, may be excavated on-site natural sand soils. Existing soils which contain organic materials and natural or fill soils which contain clay are unsuitable for use under structures.

D. Approval of Fill Material: All material that is proposed to be used as fill shall be graded and tested for moisture content and compactability. Gradation and test results shall be submitted for review and approved by the Soils Engineer prior to placement of fill.

E. Fill placed at locations other than those requiring structural fill, where the purpose is to raise site grades, shall be "common fill" as defined herein: Common fill shall be imported or excavated on-site material and shall consist of granular soils essentially cleaned of organic and other deleterious material and of such particle size and gradation that specified compaction can be readily attained. The moisture content of common fill material at placement and compaction shall be within a range of 1 percent above to 2 percent below optimum moisture content. Common fill, whether excavated on site or imported, shall be tested and approved by the Soils Engineer prior to use.

PART 3 – EXECUTION

3.1 PREPARATION

A. Establish and identify required lines, levels, contours, and datum using a Washington licensed professional land surveyor employed by Contractor.

B. Maintain benchmarks, monuments, and other reference points. Re-establish if disturbed or destroyed, at no additional cost to the Owner by a Washington licensed professional land surveyor.

C. Before start of grading, establish the location and extent of existing utilities in the Work area to the fullest extent possible using locator services.

D. Many utilities are known to exist on the site. Many of these have already been field located and are shown on the Plans. Contractor is, however, responsible for the protection of all locatable utilities.

E. Do not perform cut and fill work in weather that will not allow working of site soils. Use no frozen material in fills.

F. Use normal construction methods generally, but if weather will not allow working of site soils, use wet weather methods as noted below at no additional cost to the Owner.

G. Provide temporary ditching as needed so that no areas of the site will have standing water during rainfall. Fill or pump low areas that cannot otherwise be drained to an acceptable discharge point.

3.2 UTILITIES

A. Before starting excavation, establish location and extent of underground utilities occurring in work area to the fullest extent possible using locator services.

B. Maintain existing utility lines to remain which pass through Work area, and as shown on the Drawings.

C. Protect utility services uncovered by excavation unless noted for removal.

D. Accurately locate and record abandoned and active utility lines re-routed or extended on Project Record Documents.

3.3 TEMPORARY EROSION AND SILTATION CONTROL

A. All Work shall conform to Jurisdiction requirements. The Work shall be in accordance with WSDOT-APWA including APWA supplements except all costs for the Work shall be considered incidental to and included in the bid price.

3.4 PROTECTION OF EXISTING FACILITIES

A. Pavement: The Contractor shall protect from damage all pavement or paved areas intended to remain.

B. Access Streets and Roadways: If streets are fouled, they must be cleaned immediately in conformance with the City of Kittitas and all governing requirements and regulations.

C. Provide protection of existing trees to remain.

D. Repair and/or replacement of damaged facilities will be accomplished at the Contractor's expense.

3.5 SITE GRADING

A. General: Required contours and elevations are indicated and noted on Drawings; should indicated figures conflict with actual conditions, notify Architect and await his directions before proceeding.

3.6 EXCAVATION AND GRADING AND FILING

A. Proofing-Rolling:

1. After stripping operations are complete or cuts are complete in any area and prior to fill placement, the area shall be proof-rolled as follows.

   a. In areas of pavement use several passes of heavy rubber tired construction equipment or other equipment as necessary to compact the surface to a dense unyielding condition and to a soil density in the upper 24 in. of exposed granular soil equal to the compaction level noted in paragraph 3.07 of this Section.

   b. If loose and/or wet spongy zones are detected, the soils should be dried or moistened as required (including scarifying, mixing and/or aeration), reworked, and adequately compacted to the densities previously indicated. Avoid traffic which will introduce pumping of soils and result in softened soils.

B. Excavate and Fill:

1. Excavating General: Provide excavation of whatever nature required for construction of the Work; verify character, quality, and disposition of material to be excavated prior to commencing. Blasting will not be permitted.

   a. Excavate as required to provide grades shown on the Plans.

2. Place structural fill material full cross section width, in layers not exceeding 8 in. loose depth, each layer compacted to dense, unyielding condition as hereinafter specified; depths are required to receive specified work.

3. Machine slope banks are required, and compact to 90%. Maximum slope shall be 2:1 horizontal to vertical.

4. When complete, verify soil bearing capacities, depths, and dimensions.

5. Correct unauthorized excavations directed, at no cost to Owner.

6. Do not disturb soil within branch spread of existing trees that are to remain.

7. If necessary to excavate through roots, perform work by hand and cut roots with a sharp ax.

8. Ensure areas to be backfilled are free from debris, snow, ice and water, and that ground surfaces are not in a frozen condition.

9. Do not backfill over existing sub-grade surfaces which are porous, wet or spongy.

10. Rework and compact existing sub-grade surfaces if densities are not equal to that required for backfill materials.

11. Backfill systematically and as early as possible to allow maximum time for natural settlement and compaction.

12. Maintain optimum moisture content of backfill materials to attain required compaction density.

13. Comply with requirements of Section 01 56 39 when excavation or trenching is required within dripline of tree(s) to remain.

C. Wet Weather Conditions:

1. Schedule work in all areas for dry weather periods. If wet weather is encountered and earthwork is unavoidable, Contractor shall at no additional expense to Owner complete the following:

   a. Slope the ground surface in the construction area to promote the rapid run-off of precipitation and to prevent ponding of water. Pump continuously all areas that pond water during rainfall.

   b. Accomplish earthwork in small sections to minimize exposure to wet weather by the removal of unsuitable soil and placement and compaction of at least 12 in. of dry structural fill on the same day. Limit the size of equipment to prevent soil disturbance.

   c. Leave no fill soil uncompacted to soak up water. Use appropriate equipment to daily roll the fill surface to seal out as much water as possible.

   d. Remove soils that become too wet for compaction and replace with dry on site structural fill material.

   e. Cover exposed areas with plastic.

   f. Accomplish excavation and placement of structural fill material in cooperation with the Owner's quality control representative to determine that all work is being accomplished in accordance with these recommendations.

3.7 COMPACTION

A. See proof-rolling specified in 3.6.A, required after stripping topsoil. Compact any site grading and filling performed under this contract with approved compacting devices and materials to attain minimum percentages of modified Proctor maximum dry density, as determined by ASTM D1557 latest edition as follows:

1. Subgrade cut and fill materials for all trenches, paving, walks, building, and cut and fill slopes – 95%. Compact building areas to footprint of building plus height of fill, and paved areas, to 1 foot beyond limits of pavement or to pavement limits plus height of fill, whichever is greater.

2. Import gravel for roads – 95%.

3. Sub-grade and fill materials of all other stripped areas to receive filling – 85%.

3.8 DISPOSAL OF EARTH MATERIALS

A. All excess or unsatisfactory soils material shall be disposed of at a permitted site off the Owner's property selected by the Contractor.

B. All disposal of waste or excess material shall be at the Contractor's expense and shall meet all federal, state, and local regulations, including requirements of County grading permit.

3.9 FIELD QUALITY CONTROL

A. Contractor is responsible to conduct special inspections to verify conformance with Specifications and Drawings:

B. Compaction:

1. Compact all fill and backfill to prevent subsequent settlement.

2. Water settling or jetting will not be permitted as a means of compaction.

3. Furnish heavy rollers or compactors except as follows:

a. Use pneumatic hand tampers for trenches and areas not accessible to heavy equipment.

3.10 FINISH GRADING

A. Finish grade to =1\10 ft.

B. Remove all concrete, rocks, rubble and debris larger than 1 in. on a side from surface.

C. Execute any fine grading as may be necessary or incidental to all future operations.

D. Finish grades flush with adjacent surfaces unless indicated otherwise.

E. Finish grades will be inspected and approved by Owner.

F. Protect and maintain finished surfaces.

1. Allow no heavy objects to move over finish graded surfaces. At no cost to Owner, repair any ruts or holes in finished surfaces, and any obstructions to positive drainage. Repair areas showing settlement.

END OF SECTION

SECTION 321313 - EXTERIOR CONCRETE PAVING

PART 1 - GENERAL

1.1 REFERENCES

A. ACI 304 - Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete.

B. ASTM A185 - Welded Steel Wire Fabric for Concrete Reinforcement.

C. ASTM A497 - Welded Deformed Steel Wire Fabric for Concrete Reinforcement.

D. ASTM A615 - Deformed and Plain Billet-Steel for Concrete Reinforcement.

E. ASTM C33 - Concrete Aggregates.

F. ASTM C94 - Ready Mix Concrete.

G. ASTM C150 - Portland Cement

H. ASTM C260 - Air-Entraining Admixtures for Concrete.

I. ASTM C309 - Liquid Membrane-Forming Compounds for Curing Concrete.

J. ASTM D1751 - Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction.

K. WSDOT-APWA - Standard Specifications for Road, Bridge and Municipal Construction (Latest Version).

1.2 QUALITY ASSURANCE

A. Perform work in accordance with ACI 301.

B. Obtain cementitious materials from same source throughout.

1.3 ENVIRONMENTAL REQUIREMENTS

A. Do not place concrete when base surface temperature is less than 40 degrees F, or surface is wet or frozen.

1.4 SUBMITTALS

A. Submit under provisions of Section 013300, Submittal Procedures and as further provided.

B. Material Certificates:

1. Provide a letter, signed by the supplier and reviewed and also signed by an officer of the General Contractor's company, certifying that all products to be incorporated into the work meet the requirements specified.
2. Products:
   a) Cementitious materials.
   b) Admixtures.
   c) Curing compounds.
   d) Applied finish materials.
   e) Bonding agent or epoxy adhesive.
   f) Joint fillers.
   g) Sand.

PART 2 - PRODUCTS

2.1 FORM MATERIALS

C. Formwork: Matched, tight fitting and adequately stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of concrete.

D. Joint Filler and Sealant: Shall be in accordance with WSDOT Section 9-04.1 and 9-04.2.

E. Refer to Section 03 35 60 and 03 45 00 for stamped concrete finish and color information.

2.3 CRUSHED GRAVEL BASE COURSE

A. Provide a crushed rock base course of 1-1/4 inch maximum crushed aggregate described as follows:

1. Gravel base shall consist of granular material, either naturally occurring or processed. It shall be essentially free from various types of wood waste or other extraneous or objectionable materials. It shall have such characteristics of size and shape that it will compact readily and shall meet the following test requirements:

Stabilometer "R" Value	72 min.
Swell pressure	0.3 psi max.

2. The maximum particle size shall not exceed 2/3 of the depth of the layer being placed.

3. Gravel base shall meet the following requirements for grading and quality.

Sieve Size		Percent Passing
square		25 min.
No. 200		10.0 max.
Dust Ratio:	% Passing U.S. No. 200 / % Passing U.S. No. 40	2/3 max.
Sand Equivalent		30 min.

All percentages are by weight.

4. Gravel base material retained on a 1/4-inch square sieve shall contain not more than 0.20 percent by weight of wood waste.

2.4 CONCRETE MATERIALS

A. Concrete Pavement and Curbs: Refer to notes on the plans.

B. WHEEL STOPS:

1. Securely attach wheel stops into pavement with not less than two galvanized steel dowels embedded in holes drilled or cast into wheel stops at one-quarter to one-third points. Firmly bond each dowel to wheel stop and to pavement. Securely install dowels into pavement and bond to wheel stop. Recess head of dowel beneath top of wheel stop.

C. CEMENT CONCRETE WALKS

1. Conform to detail and WSDOT Specification 8-14.2 for on-site improvements.
2. Provide joint control and surface treatment as indicated on plans.
3. Provide 1.5 percent transverse slope away from building unless otherwise indicated.
4. Provide 3/8-inch by 4-inch premolded joint filler expansion at 10-foot maximum interval, unless indicated otherwise.
5. Conform to detail shown and WSDOT Specification 8-14.3.

2.5 ACCESSORIES

A. Curing Compound: ASTM C309, Type 1.

B. Clear Sealer: L&M Construction Chemicals, LATICRETE International Inc.: “Aquapel Plus”.

C. Surface Retarder.

D. Joint Filler: ASTM D994; asphalt impregnated fiberboard or felt, 1/4 inch thick; full depth of concrete slab.

2.6 ADMIXTURES

A. Use accelerating admixtures in cold weather only when acceptable to Architect. Use of admixtures shall not relax cold weather placement requirements. Do not use calcium chloride.

B. Use set-retarding admixtures during hot weather only when acceptable to Architect.

C. Air entrainment, ASTM C260 at all exterior concrete.

2.7 CONCRETE MIX

A. Mix concrete in accordance with ASTM C94. Refer to Civil Notes.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify compacted granular base is acceptable and ready to support paving and imposed loads.

B. Verify gradients and elevations of base are correct.

C. Beginning of installation means acceptance of existing conditions.

3.2 PREPARATION

A. Moisten base to minimize absorption of water from fresh concrete.

B. Notify Architect/Engineer minimum twenty-four (24) hours prior to commencement of concreting operations.

3.3 FORMING

A. Place and secure forms to correct location, dimension, profile, and gradient.

B. Assemble formwork to permit easy stripping and dismantling without damaging concrete.

C. Place joint filler vertical in position, in straight lines. Secure to formwork during concrete placement.

3.5 PLACING CONCRETE

A. Place concrete in accordance with ACI 304.

B. Ensure reinforcement, inserts, embedded parts, and formed joints are not disturbed during concrete placement.

C. Place concrete continuously between predetermined construction joints. Do not break or interrupt successive pours such that cold joints occur.

3.6 JOINTS

A. Place control joints at maximum 20-ft intervals. Stamped finish texture.

B. Place joint filler between paving components and building or other appurtenances.

C. Extend joint fillers full width and depth of joint (less sealant thickness), not less than 1/2 inch or more than 1 inch below finished surface where joint sealer is indicated.

D. Furnish joint fillers in one-piece lengths for full width being placed wherever possible. Where more than one length is required, lace or clip joint filler sections together.

E. Protect top edge of joint filler during concrete placement with a metal cap or other temporary materials. Remove protection after concrete has been placed on both sides of joint.

3.7 FINISHING

A. Exterior Concrete Paving: Stamped wood plank finish. Refer to Section 03 35 60 for Stamped Colored Concrete finish.

B. Place color and clear sealer on exterior concrete paving surfaces immediately after finishing. Apply in accordance with manufacturer's instructions.

3.8 PROTECTION

A. Immediately after placement, protect pavement from premature drying, excessive hot or cold temperatures, and mechanical injury. Do not allow traffic or external forces in contact with tactile warning tiles during concrete curing stage, to avoid dislodging tiles or creating voids beneath the tiles.

END OF SECTION