

L260-6530-2024  
October 9, 2024



EW-C6530

PROJECT MANUAL

FOR

COMFORT STATION RENOVATION

AT

LEWIS & CLARK TRAIL STATE PARK

IN

COLUMBIA COUNTY

**BID OPENING: 1:00 P.M., THURSDAY, DECEMBER 12, 2024**

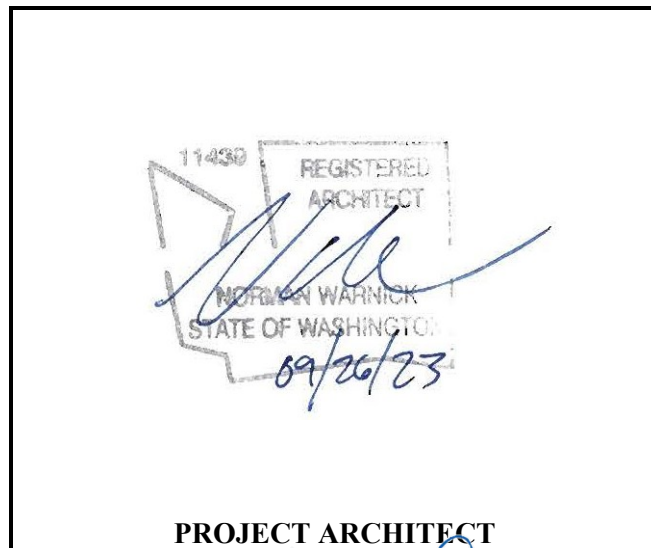
**ELECTRONIC BID RESPONSES ONLY: Bid responses will only be accepted electronically via Email/Email Attachment to BidBox@parks.wa.gov. (PDF scan encouraged).**

**\*\*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**  
**COMFORT STATION RENOVATION**  
**AT**  
**LEWIS & CLARK TRAIL STATE PARK**  
**IN**  
**COLUMBIA COUNTY**



Approved for Construction

*Heather Saunders*  
Heather Saunders, Assistant Director

**WASHINGTON STATE PARKS AND RECREATION COMMISSION**  
**111 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 – Lewis and Clark Trail State Park – Comfort Station Renovation – EW-C6530**

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:	<u>EW-C6530</u>
PROJECT TITLE:	<u>Comfort Station Renovation</u>
PROJECT DESCRIPTION:	<u>This project involves renovating 350 sq. ft. of a historic restroom building to create a new accessible restroom and service/storage area, along with exterior ADA parking and an EV charging station.</u>
PROJECT LOCATION:	<u>The project is located at the Lewis &amp; Clark Trail State Park, 36149 Us Highway 12, Dayton, Washington 99328</u>
ESTIMATED BID RANGE:	<u>\$214,000.00 - \$237,000.00</u>
PROCUREMENT COORDINATOR	<u>Manuel Iglesias</u>
BID OPENING TIME:	<u>1:00 PM on Thursday, December 12, 2024</u>
PREBID WALKTHROUGH:	<u>2:00 PM on Wednesday, December 4, 2024. Meet at Project site: day use area south side of highway, 36149 Us Highway 12, Dayton, Washington 99328.</u>

**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 “**12/12/2024**”. (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](http://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: Ned Warnick, Project Representative at (509) 332-3113, [nwarnick@designwestpa.com](mailto:nwarnick@designwestpa.com).

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](http://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

**LEWIS & CLARK TRAIL STATE PARK  
COMFORT STATION RENOVATION**

"ADVERTISEMENT FOR BID" LETTERS

INVITATION TO BID .....i - ii

INSTRUCTIONS TO BIDDERS ..... 17 pages

BID PROPOSAL FORM ..... 5 pages

GENERAL CONDITIONS ..... 42 pages

PREVAILING WAGE STATEMENT .....1 page

DIVISION 1 - GENERAL REQUIREMENTS

Section 010000 - General Requirement ..... 5 pages

Section 013233 - Photographic Documentation ..... 2 pages

Section 013300 – Submittal Procedures ..... 1 page

Section 013501 – Inadvertent Discoveries Of Cultural Resources ..... 5 pages

Section 013591 - Historic Treatment Procedures ..... 6 pages

Section 014000 - Quality Requirements ..... 5 pages

Section 014100 - Regulatory Requirements ..... 2 pages

Section 014200 - References ..... 3 pages

Section 015000 - Temporary Facilities and Controls ..... 5 pages

Section 015639 - Temporary Tree and Plant Protection ..... 6 pages

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DIVISION 2 – EXISTING CONDITIONS

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DIVISION 3 – CONCRETE

Section 033000 – Cast-In-Place Concrete ..... 15 pages

DIVISION 5 – METALS

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DIVISION 6 – WOOD, PLASTICS & COMPOSITES

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Section 061600 - Sheathing ..... 2 pages

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**DIVISION 7 – THERMAL & MOISTURE PROTECTION**

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**DIVISION 8 – OPENINGS**

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**DIVISION 9 – FINISHES**

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**DIVISION 10 – SPECIALTIES**

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Section 102800 – Toilet & Bath Accessories .....	5 pages

**DIVISION 22 - PLUMBING**

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Section 221119 – Domestic Water Piping Specialties.....	5 pages
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Section 224000 – Plumbing Fixtures .....	8 pages

**DIVISION 23 – HEATING, VENTILATING & AIR CONDITIONING**

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**LEWIS & CLARK TRAIL STATE PARK  
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END OF SECTION



**LEWIS & CLARK TRAIL STATE PARK  
COMFORT STATION RENOVATION**

INVITATION TO BID

1.1 DESCRIPTION OF WORK

- A. At the Lewis & Clark Trail State Park, this project includes the interior renovation of approximately 350 square feet of an existing historical restroom building to provide a new disabled accessible restroom and service/storage space. Also, included in the project scope is exterior parking spaces for disabled access and electric vehicle charging station.
- B. The project is located at 36149 Us Highway 12, Dayton, Washington 99328

1.2 TECHNICAL QUESTIONS

- A. Direct project questions to Ned Warnick Project Representative at 509-332-3113, [nwarnick@designwestpa.com](mailto:nwarnick@designwestpa.com).

1.3 PRE-BID PROJECT SITE TOUR

DATE:	Wednesday December 4, 2024
TIME:	2:00 PM
LOCATION:	Project site: day use area south side of highway, 36149 Us Highway 12, Dayton, Washington 99328

1.4 BID OPENING

- A. Bid responses will only be accepted electronically via email/email attachment [BidBox@parks.wa.gov](mailto:BidBox@parks.wa.gov). See Section 7.1 of the Instructions to Bidders for expanded details. Subject line shall read, EW-C6530 [YOUR COMPANY NAME]. Bids are due at 1:00 p.m., Thursday, December 12, 2024.
- 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](http://www.parks.wa.gov/contracts) or through Builders Exchange of Washington at [www.bxwa.com](http://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.

1.5 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 \(wa.gov\)](#)

**LEWIS & CLARK TRAIL STATE PARK  
COMFORT STATION RENOVATION**

1.6 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.

1.7 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  
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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
<hr/>	
Alaska CPD Total	\$ 5,000
Alaska Nonresident Contractor Bid Amount	\$100,000
Alaska CPD Total	\$ 5,000
<hr/>	
Nonresident Disadvantage Total	\$105,000*

## WASHINGTON STATE PARK AND RECREATION COMMISSION PUBLIC WORKS PROJECT

\* 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

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**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 BUSINESS 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:

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<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

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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

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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



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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.

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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](mailto: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.

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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](mailto: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](mailto: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](mailto: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.**

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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](mailto: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](mailto: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.

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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](http://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](http://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.

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- 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

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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.

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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](mailto: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.



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**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.

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Dissemination: The Agency will disseminate the decision to all interested Bidders via 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:

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<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**

/ / / / /



LEWIS & CLARK TRAIL STATE PARK  
COMFORT STATION RENOVATION

**BIDS DUE:**  
1:00PM, THURSDAY,  
DECEMBER 12, 2024

BID DELIVERY LOCATION:

**DELIVER BIDS ELECTRONICALLY TO [BIDBOX@PARKS.WA.GOV](mailto:bidbox@parks.wa.gov)**

**Subject line to read: "EW-C6530 [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 \*\***

<h1>TOTAL BASE BID</h1> <p>(NOT INCLUDING SALES TAX)</p>	
↓ 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 ↑ <b>(NO PO Boxes Here)</b>
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) ↑



**LEWIS & CLARK TRAIL STATE PARK  
COMFORT STATION RENOVATION**

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.	Renovations of existing comfort stations	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						
<b>TOTALS</b>						

Bidder may attach a separate sheet for additional MWBE Utilization Certification.



## LEWIS & CLARK TRAIL STATE PARK COMFORT STATION RENOVATION

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 within **120** calendar days from the date provided on the Notice to Proceed letter.

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.

**Addenda:** Receipt of addenda numbered [ ] through [ ] is hereby acknowledged.

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**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.



**LEWIS & CLARK TRAIL STATE PARK  
COMFORT STATION RENOVATION**

**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.



**LEWIS & CLARK TRAIL STATE PARK  
COMFORT STATION RENOVATION**

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	<b>Bidder MUST check one box for each Category of Work.</b> If subcontracting the work, bidder must name the subcontractor.
HVAC (Heating, Ventilation & Air Conditioning)	<input type="checkbox"/> Name of Subcontractor: _____ <input type="checkbox"/> Bidder will self-perform this work, or the project does not include this work.
Electrical	<input type="checkbox"/> Name of Subcontractor: _____ <input type="checkbox"/> Bidder will self-perform this work, or the project does not include this work.
Plumbing	<input type="checkbox"/> Name of Subcontractor: _____ <input type="checkbox"/> 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	<b>Bidder MUST check one box for each Category of Work.</b> If subcontracting the work, bidder must name the subcontractor.
Structural Steel Installation	<input type="checkbox"/> Name of Subcontractor: _____ <input type="checkbox"/> Bidder will self-perform this work, or the project does not include this work.
Rebar Installation	<input type="checkbox"/> Name of Subcontractor: _____ <input type="checkbox"/> 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

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**Signature of Authorized Official**



## GENERAL CONDITIONS FOR CONSTRUCTION AT WASHINGTON STATE PARKS

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# 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.

## GENERAL CONDITIONS FOR CONSTRUCTION AT WASHINGTON STATE PARKS

- 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.

# GENERAL CONDITIONS FOR CONSTRUCTION AT WASHINGTON STATE PARKS

## 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.

# GENERAL CONDITIONS FOR CONSTRUCTION AT WASHINGTON STATE PARKS

## 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:

<u>EACH OCCURRENCE</u>	<u>AGGREGATE</u>
\$500,000.00	\$1,000,000.00

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

## GENERAL CONDITIONS FOR CONSTRUCTION AT WASHINGTON STATE PARKS

- 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.

# GENERAL CONDITIONS FOR CONSTRUCTION AT WASHINGTON STATE PARKS

## 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

## GENERAL CONDITIONS FOR CONSTRUCTION AT WASHINGTON STATE PARKS

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



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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.

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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

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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

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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.

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### 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 prefled 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

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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

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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:

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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:



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- 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

## GENERAL CONDITIONS FOR CONSTRUCTION AT WASHINGTON STATE PARKS

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

## GENERAL CONDITIONS FOR CONSTRUCTION AT WASHINGTON STATE PARKS

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

## GENERAL CONDITIONS FOR CONSTRUCTION AT WASHINGTON STATE PARKS

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

## GENERAL CONDITIONS FOR CONSTRUCTION AT WASHINGTON STATE PARKS

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.

## GENERAL CONDITIONS FOR CONSTRUCTION AT WASHINGTON STATE PARKS

- 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:

## GENERAL CONDITIONS FOR CONSTRUCTION AT WASHINGTON STATE PARKS

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.

# GENERAL CONDITIONS FOR CONSTRUCTION AT WASHINGTON STATE PARKS

## 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



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- 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.

## GENERAL CONDITIONS FOR CONSTRUCTION AT WASHINGTON STATE PARKS

- 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

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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.

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- 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

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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.

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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:

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- 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.

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- 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:



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- 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

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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

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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.

## GENERAL CONDITIONS FOR CONSTRUCTION AT WASHINGTON STATE PARKS

### 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,

## GENERAL CONDITIONS FOR CONSTRUCTION AT WASHINGTON STATE PARKS

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.

## GENERAL CONDITIONS FOR CONSTRUCTION AT WASHINGTON STATE PARKS

- 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

## GENERAL CONDITIONS FOR CONSTRUCTION AT WASHINGTON STATE PARKS

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.

## GENERAL CONDITIONS FOR CONSTRUCTION AT WASHINGTON STATE PARKS

- 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.



## GENERAL CONDITIONS FOR CONSTRUCTION AT WASHINGTON STATE PARKS

- 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](mailto: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.

## GENERAL CONDITIONS FOR CONSTRUCTION AT WASHINGTON STATE PARKS

The Contractor may contact State Parks Contracts and Grants at [contracts@parks.wa.gov](mailto: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



## **PREVAILING WAGES**

### **Instruction for Prevailing Wage Rates**

The State of Washington prevailing wage rates for this public works project, which is located in Columbia 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](mailto:contracts@parks.wa.gov).

**LEWIS & CLARK TRAIL STATE PARK  
COMFORT STATION RENOVATION**

SECTION 010000 – GENERAL REQUIREMENTS

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

- A. This project includes the interior renovation of approximately 350 square feet of an existing historical restroom building to provide a new accessible restroom and service/storage space. Also included in the project scope is exterior parking spaces for disabled access and electric vehicle charging station.

1.2 TIME FOR COMPLETION OF PROJECT

- A. Substantially complete the project in accordance with the drawings and specifications within 180 calendar days from date on Notice to Proceed letter. Final completion in accordance with Contract Documents within 30 calendar days from substantial completion date.

1.3 HOURS OF WORK

- A. Work hours are between 7:00 a.m. and & 7:00 p.m. Monday through Friday, excluding national holidays.

1.4 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.

1.5 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.

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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 item of Work listed. This will be used in processing Contractor's requests for partial payment. Submittal of breakdown does not affect the Contract terms.

1.6 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.

1.7 AS-BUILT DRAWINGS

- A. Keep a clean set of full-sized drawings at job site to use to identify changes.

1.8 PROJECT CONDITIONS

- A. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
  1. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Project Representative and Owner. Owner will remove hazardous materials under a separate contract.

1.9 PROJECT SIGN

- A. Provide following temporary sign. Sign location is shown on drawings or determined by Project Representative. Upon Project completion, remove sign and restore area to original condition.

1.10 PROJECT SIGN LETTERING

TITLE OF PROJECT:	COMFORT STATION RENOVATION
NAME OF FACILITY:	LEWIS & CLARK TRAIL STATE PARK
NAME OF CONTRACTOR:	(Place Contractor's Name here)
ADDRESS OF CONTRACTOR:	(Place Contractor's Address here)
FUNDING TITLE NUMBER 1:	STATE BUILDING CONSTRUCTION ACCOUNT
FUNDING TITLE NUMBER 2:	LEAVE BLANK FOR THIS PROJECT

**LEWIS & CLARK TRAIL STATE PARK  
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1.11 PARTNERSHIP IN THE CONTRACT

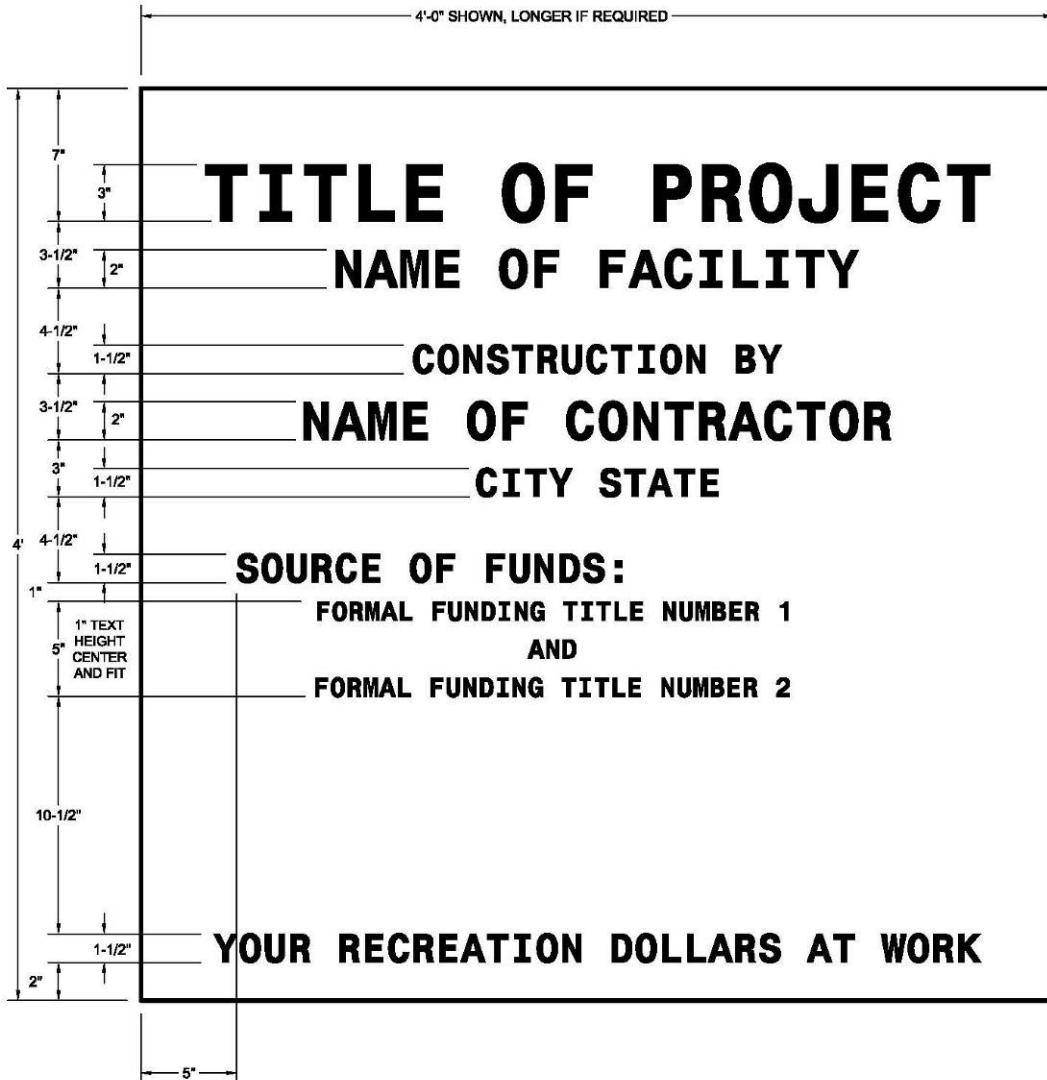
- A. As partners in this contract, both Contractor and Commission recognize the value of a successful Project. Both parties recognize, besides the tangible benefits to Contractor and the Commission, the citizens of Washington State and visitors to Washington State Parks will benefit immensely from the successful completion of a quality Project.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

LEWIS & CLARK TRAIL STATE PARK  
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PROJECT SIGN DETAIL

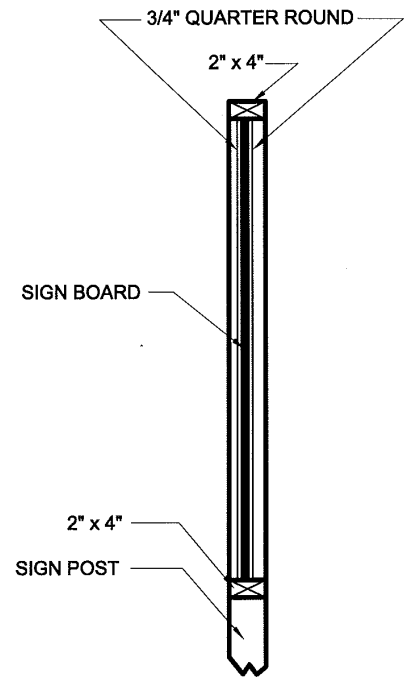
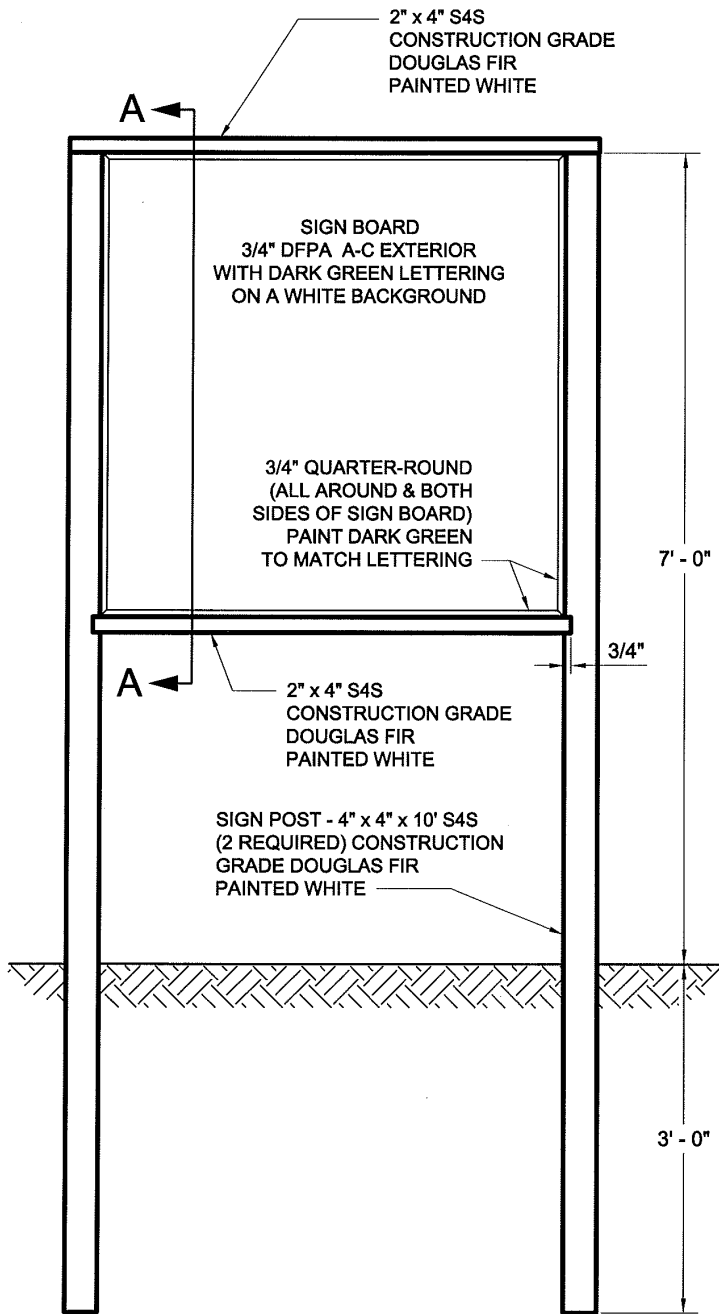


LAY OUT SIGN TO FIT ON A PORTION OF ONE (1) SHEET OF PLYWOOD. IF PLYWOOD IS THE FINAL SURFACE, PAINT IT WITH TWO (2) OR MORE COATS OF WHITE PAINT TO FORM A SMOOTH, NONABSORBENT SURFACE. PROVIDE DARK GREEN WELL FORMED LETTERS, EVENLY SPACED, NEAT IN APPEARANCE, AND ALIGNED AS SHOWN ABOVE.

WASHINGTON STATE PARKS  
PROJECT SIGN DETAIL

LEWIS & CLARK TRAIL STATE PARK  
COMFORT STATION RENOVATION

PROJECT SIGN DETAIL



SECTION A - A

END OF SECTION



**LEWIS & CLARK TRAIL STATE PARK  
COMFORT STATION RENOVATION**

SECTION 013233 - PHOTOGRAPHIC DOCUMENTATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for the following:

1. Preconstruction photographs.
2. Construction photographs.

1.2 INFORMATIONAL SUBMITTALS

A. Key Plan: Submit key plan of Project site and building with notation of vantage points marked for location and direction of each photograph. Indicate elevation of camera. Include same information as corresponding photographic documentation.

B. Digital Photographs: Submit image files within three calendar days of taking photographs.

1. Digital Camera: Minimum sensor resolution of 8 megapixels.
2. Format: Minimum **1600 by 1200** pixels, **400** dpi minimum, in unaltered original files, with same aspect ratio as the sensor, uncropped, date- and time- stamped, in folder named by date of photograph, accompanied by key plan file.
3. Identification: Provide the following information with each image description in file metadata tag:
  - a. Name of Project.
  - b. Name of Contractor.
  - c. Date photograph was taken.
  - d. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.
  - e. Unique sequential identifier keyed to accompanying key plan.

1.3 COORDINATION

A. Auxiliary Services: Cooperate with photographer and provide auxiliary services requested, including access to Project site and use of temporary facilities, including temporary lighting required to produce clear, well-lit photographs.

1.4 USAGE RIGHTS

A. Obtain and transfer copyright usage rights from photographer to Owner for unlimited reproduction of photographic documentation.

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PART 2 - PRODUCTS

2.1 PHOTOGRAPHIC MEDIA

- A. Digital Images: Provide images in JPG format, produced by a digital camera with minimum sensor size of 8 megapixels, and at an image resolution of not less than 1600 by 1200 pixels and 400 dpi.

PART 3 - EXECUTION

3.1 CONSTRUCTION PHOTOGRAPHS

- A. General: Take photographs using the maximum range of depth of field, and that are in focus, to clearly show the Work. Photographs with blurry or out-of-focus areas will not be accepted.
  - 1. Maintain key plan with each set of construction photographs that identifies each photographic location.
- B. Digital Images: Submit digital images exactly as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.
  - 1. Date and Time: Include date and time in file name for each image.
- C. Preconstruction Photographs: Before **starting construction**, take photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points.
  - 1. Take a minimum of 20 photographs to show existing conditions adjacent to property before starting the Work.
  - 2. Take minimum of 20 photographs of existing buildings either on or adjoining property to accurately record physical conditions at start of construction.
  - 3. Take additional photographs as required to record settlement or cracking of adjacent structures, pavements, and improvements.
- D. Periodic Construction Photographs: Take minimum of 20 photographs monthly, coinciding with the cutoff date associated with each Application for Payment. Select vantage points to show status of construction and progress since last photographs were taken.
- E. Final Completion Construction Photographs: minimum of 20 color photographs after date of Substantial Completion for submission as project record documents.

END OF SECTION 013233

**LEWIS & CLARK TRAIL STATE PARK  
COMFORT STATION RENOVATION**

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

**LEWIS & CLARK TRAIL STATE PARK  
COMFORT STATION RENOVATION**

SECTION 013501 – INADVERTENT DISCOVERIES OF CULTURAL RESOURCES AND HUMAN SKELETAL REMAINS

PART 1 - GENERAL

1.1 PROJECT SPECIFIC REQUIREMENTS

- A. No cultural resource sites are known to exist within Work area. However, there always exist the potential for unanticipated discoveries during excavation work.

1.2 EMERGENCY CONTACTS

WSPRC Archaeologists

Jennifer Wilson, Archaeology Program Manager	(360) 787-6511 (cell)
Email: <a href="mailto:jennifer.wilson@parks.wa.gov">jennifer.wilson@parks.wa.gov</a>	(360) 902-8637 (office)
Shari Silverman, Archaeologist SW Region	(435) 260-9894 (cell)
Email: <a href="mailto:shari.silverman@parks.wa.gov">shari.silverman@parks.wa.gov</a>	(360) 902- 8640 (office)
Kayley Bass, Archaeologist SW Region	(360) 701-1277 (cell)
Emails: <a href="mailto:kayley.bass@parks.wa.gov">kayley.bass@parks.wa.gov</a>	
Sarah DuBois, Archaeologist Eastern Region	(360) 972-5884 (cell)
Email: <a href="mailto:sarah.dubois@parks.wa.gov">sarah.dubois@parks.wa.gov</a>	(509) 665-4336 (office)
Ayla Aymond, Archaeologist Eastern Region	(509) 743-8251 (cell)
Email: <a href="mailto:ayla.aymond@parks.wa.gov">ayla.aymond@parks.wa.gov</a>	
Sean Stcherbinine, Archaeologist NW Region	(360) 770-1419 (cell)
Email: <a href="mailto:sean.stcherbinine@parks.wa.gov">sean.stcherbinine@parks.wa.gov</a>	
Laura Syvertson, Archaeologist NW Region	(360) 770-0444 (cell)
Email: <a href="mailto:laura.syvertson@parks.wa.gov">laura.syvertson@parks.wa.gov</a>	
Maurice Major, Stewardship Archaeologist	(360) 701-6218 (cell)
Email: <a href="mailto:maurice.major@parks.wa.gov">maurice.major@parks.wa.gov</a>	(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

Jackie Berger, Dept. of Archaeology and Historic Preservation (360) 890-2633 (cell)

County Coroner/Examiner

C. Dale Slack, Ex-Officio Coroner, Prosecuting Attorney (509)382-1197 (office)

Local Law Enforcement

Patti Wong, Park Ranger 3 (509)990-4918

Area Manager

Audra Sims (509)337-6457

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Region Manager  
Jason Both

(509)665-4317

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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 INADVERTENT DISCOVERY PLAN FOR CULTURAL RESOURCES

- A. If cultural resources are found during a project, activity in the immediate area of the find should be discontinued (**stop**), the area secured (**protect**), and the WSPRC archaeologists notified to assess the find (**notify**). *When in doubt, assume the material is a cultural resource and implement the IDP outlined below.*
- B. **Recognizing Cultural Resources-Types of Historic/Prehistoric Artifacts and/or Activity Areas That May Be Found**
1. Artifacts- Both historic and prehistoric artifacts may be found exposed in backhoe trenches or back dirt piles.
    - a) Prehistoric artifacts may range from finished tools such as stone pestles, arrowheads/projectile points, shell beads, or polished bone tools to small pieces or “flakes” or “chips” of exotic stone such as chert, jasper, or obsidian.
    - b) Historic artifacts may include older (more than 50 years) nails, plates/ceramics, bottles, cans, coins, glass insulators, or bricks.
    - c) Old abandoned industrial materials from farming, logging, railways, lighthouses, and military installations.
  2. Activity Area/Cultural Features- While excavating trench lines look for evidence of buried activity areas/cultural features such as old campfire hearths or buried artifacts.
    - a) An area of charcoal or very dark stained soil with artifacts or burned rocks may be a fire hearth.

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- 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. Bone can come from either animal remains or human remains and requires a trained professional to identify. If you find bone, notify the WSPRC archaeologist immediately and follow their directions.
- 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 INADVERTENT DISCOVERY PLAN FOR HUMAN SKELETAL REMAINS

#### INADVERTENT DISCOVERIES OF CULTURAL RESOURCES AND HUMAN SKELETAL REMAINS – 013501 - 4

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A. Native American burials and historic grave sites are common 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



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then handle all consultation with the affected parties as to the future preservation, excavation, and disposition of the remains.

Note: The WSPRC archaeologist assigned to the undertaking will be coordinating and consulting with the DAHP, affected Tribes, and other groups as necessary. Additionally, WSPRC's Curator of Collections/NAGPRA Specialist should be included on all written and/or verbal correspondence until the remains have been officially transferred from WSPRC's possession to an outside authority. Until the remains are transferred off of WSPRC's property, it is the responsibility of the Curator of Collections/NAGPRA Specialist to document and track the information regarding all human remains and associated funerary objects (including all material from excavation areas/units from which the human remains were removed).

2. Construction work may resume in the protected area after the WSPRC archaeologist assigned to the undertaking has determined that the find has been adequately investigated and, if necessary, a treatment plan and monitor are in place.

END OF SECTION 013501

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SECTION 013591 - HISTORIC TREATMENT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes general protection and treatment procedures for the exterior building features of the Project and following specific work:
  - 1. Historic removal and dismantling.
  - 2. Modification of existing historical door to remain.

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** as determined by Project Representative. Designated historic aspects are the entirety of the exterior of the building..
- 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.

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- 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.
  - 2. Debris Hauling: Include plans clearly marked to show debris hauling routes, turning radii, and locations and details of temporary protective barriers.
- 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. Coordinate plan with Owner's fire-protection equipment and requirements. 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.

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- D. Standards: Comply with ANSI/ASSE A10.6.
- E. Historic Treatment Preconstruction Conference: Conduct conference in conjunction with overall project pre-construction conference.

1.5 STORAGE AND PROTECTION OF HISTORIC MATERIALS

- A. 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.
- B. 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.
- C. 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. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs.

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1. Comply with requirements specified in Division 01 Section 013233 "Photographic Documentation."
- B. 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.

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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 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.
3. Prohibit smoking by all persons within the Project work and staging areas.

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. As far as practical, restrict heat-generating equipment to shop areas or outside the building.
2. 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.
3. Use fireproof baffles to prevent flames, sparks, hot gasses, or other high-temperature material from reaching surrounding combustible material.
4. 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.
5. 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 the Project site to detect hidden or smoldering fires and to ensure that proper fire-prevention is maintained.

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

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type of fire risk in each work area. Ensure that nearby personnel and the fire watch are trained in fire-extinguisher and blanket operation.

3.4 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.
  - 5. Record existing work before each procedure (preconstruction) and progress during the work with digital preconstruction documentation. Comply with requirements in Division 01 Section 013233 "Photographic Documentation."
- 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 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.
- E. 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.

END OF SECTION 013591

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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. 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.
- E. Source Quality-Control Testing: Tests and inspections that are performed at the source, e.g., plant, mill, factory, or shop.



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- F. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- G. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
- H. 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).
- I. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five (5) previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.3 CONFLICTING REQUIREMENTS

- A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Project Representative for a decision before proceeding.
- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Project Representative for a decision before proceeding.

1.4 INFORMATIONAL SUBMITTALS

- A. 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.

1.5 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.

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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. 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.

1.6 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. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated; 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.

1.7 QUALITY CONTROL

- A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.

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1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
  2. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor.
- B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.
1. Notify testing agencies at least 48 hours in advance of time when Work that requires testing or inspecting will be performed.
  2. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
  3. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
  4. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- 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.
  5. Preliminary design mix proposed for use for material mixes that require control by testing agency.

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6. Security and protection for samples and for testing and inspecting equipment at Project site.
- 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.

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 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

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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. 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.

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- 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

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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.

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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



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- 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

**LEWIS & CLARK TRAIL STATE PARK  
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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 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:

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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:

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- 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. Eastern Regional Office: (509) 329-3400 (Adams, Asotin, Columbia, Ferry, Franklin, Garfield, Grant, Lincoln, Pend Oreille, Spokane, Stevens, Walla Walla, and Whitman 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

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- 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.

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PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

**LEWIS & CLARK TRAIL STATE PARK  
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SECTION 015639 - TEMPORARY TREE AND PLANT PROTECTION

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the administrative and procedural requirements for the protection of trees, shrubs, and plant material not designated for removal. Trees, shrubs, and plant material not designated for removal shall be left in place and protected from damage or injury during construction using full and adequate methods of protection in order to preserve these natural resources, ecological function, and aesthetic character of the park.
- B. The work of this project is not anticipated to require tree and plant protection, but these requirements apply to the contract should the contractor's work plan include work, staging, access routes, or material storage on surfaces other than the existing pavement.

1.2 REFERENCES

A. Definitions

- 1. Arborist Qualifications: An Arborist approved of by the Project Representative or certified by the International Society of Arboriculture (ISA) or Association of Consulting Arborists (ASCA) and licensed in the jurisdiction where project is located.
- 2. Critical Root Zone (CRZ): The portion of the root system nearest the stem that is critical for the stability and vitality of the tree. The minimum CRZ is a circular area having a radius of one foot for each one inch of trunk diameter defined by measuring the trunk diameter at 4.5 feet above ground level. For example, a tree that has a diameter of 20 inches would have a CRZ with a radius of 20 feet from the base of the tree. This is a MINIMUM CRZ radius for healthy trees; the CRZ often extends beyond the dripline of the tree. A critical root zone defined by 2.5 feet radius for each 1-inch diameter is desirable for old growth, historic, and character trees as designated by the Project Representative.
- 3. Vegetation Protection Zone (VPZ): A defined area of any size within the project area where existing vegetation (trees, shrubs, or other plant material) is to be protected from construction impacts. The zone may be accomplished by physical barriers or other means (e.g., soil protection layers or treatments).
- 4. Soil Protection Zone (SPZ): A defined area of any size within the project area where sensitive native soils are to be protected from construction impacts. The zone may be accomplished by physical barriers or other means (e.g., soil protection layers, durable matting, or other treatments as specified by the Project Representative).
- 5. High Risk Tree: Any tree with a structural defect and/or disease that makes the tree highly prone to failure, and which has a target and may result in personal injury or property damage. A high risk tree is the same as an "Emergency Tree" as defined in WAC 352-28-005 (<https://apps.leg.wa.gov/wac/default.aspx?cite=352-28-005>)

B. Reference Standards

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1. ANSI A300. Specifications for Tree, Shrub, and Other Woody Plant Management including Section 5: Management of Trees and Shrubs During Site Planning, Site Development, and Construction.
2. ANSI Z133-2012. Safety Requirements for Arboricultural Operations.
3. Council of Tree and Landscape Appraisers. (2020). *Guide for Plant Appraisal*, 10th ed. International Society of Arboriculture, Champaign, Illinois.

1.3 QUALITY ASSURANCE

- A. Construction Management Standard: Comply with ANSI A300 (Part 5): Management of Trees and Shrubs During Site Planning, Site Development, and Construction
- B. Tree Root Protection and Management: Comply with ANSI A300 (Part 8) - 2013 Root Management Standard

PART 2 - PRODUCTS

2.1 TREE PROTECTION MATERIALS

- A. If all work by the contractor is limited to existing paved areas at the State Park, then tree protection may be omitted. Contractor shall continually monitor the site and the work of the contract to ensure tree protection. If work, staging, access, or storage of construction materials occurs on surfaces other than existing paving, then the contractor shall comply with the requirements below.
- B. Temporary Fencing
  1. Chain link fencing panels 6 feet tall by any length up to 14 feet. Panels must be braced and must be secured to stands and weighted per manufacturers specifications.
  2. Continuous molded safety mesh 36 inches wide with clear openings no more than 1-1/2 inches x 2 inches. Orange, 40 grams per square foot, high density polyethylene with U-V inhibitor suitable for above-grade use installed around the circumference of the CRZ.
  3. Posts five-foot steel heavy-duty "T" posts, 1-3/8 inches x 1-3/8 inches x 7/64 inches with steel anchor placed at 8' intervals at or beyond the CRZ.
  4. Nylon zip straps having a minimum breaking strength of 150 lbs.

2.2 SOIL AND ROOT PROTECTION

- A. Mulch: Ground, shredded bark, or wood and bark chips, or "hog fuel" free from deleterious materials. Or new straw mulch, free from weeds, weed seeds, and foreign materials.
- B. Landscape fabric: American Excelsior Stablenka 140, Celanese Mirafi 140, Propex 45-45, or approved equivalent geotextile.
- C. Filter Fabric: Manufacturer's standard, nonwoven, pervious, geotextile fabric of polypropylene, nylon, or polyester fibers.
- D. Ground staples: 9 inches x 9 inches wire staples sufficient for holding landscape fabric or filter fabric in place for required time period.



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- E. Ground protection mats: Construction mats or timber mats, as a temporary road surface of sufficient weight rating for the equipment being operated in the work area.

2.3 TREE TRUNK PROTECTION

- A. Where work has been approved to take place within the CRZ, tree trunk protection shall be installed vertically around tree trunk on all sides exposed to construction activity.
- B. Common wood 2 inches x 4 inches lumber, 8 feet long, without nails, other hardware, concrete residue, or other material that may be detrimental to plant health.
- C. Strapping sufficient to hold 2 x 4's

PART 3 - EXECUTION

3.1 PLANNING AND NOTIFICATION

- A. Where existing trees and other vegetation are in the area of work, or where existing trees outside the area of work have a CRZ extending into the area of work, employ methods to minimize adverse impact to the existing trees (including limbs, stems, and roots), understory vegetation and their root systems, and soils. Where VPZ are designated by the Project Representative and/or in project plans, observe protection measures set forth herein. Notify the Project Representative of any construction work within the CRZ of trees at least two (2) working days before the scheduled activity.

3.2 PREPARATION

- A. Prior to Construction: If work is to occur off of existing paved surfaces then contractor shall erect tree and plant protection prior to beginning any site work. Protect trees to remain against cutting, breaking, skinning, or compaction of roots; skinning or bruising of bark; breaking of branches and foliage. Review locations, fencing, and other markings of any VPZ and CRZ for trees within the construction area with the Project Representative.
- B. Material Storage: Do not store construction materials, debris, or excavated material inside critical root zones or vegetation protection zones.
- C. Vehicle and Foot Traffic: Designate access routes within construction area and limitations on equipment and vehicles. Designate parking on existing pavement or away from critical root zones of trees. Tree protection fencing will serve as an exclusion zone within the CRZ except for where plans stipulate work will take place within the CRZ.

3.3 CRITICAL ROOT ZONE AND VEGETATION PROTECTION ZONE DESIGNATION

- A. Temporary Fencing: Install temporary fencing around CRZ, VPZ, or SPZ of either chain link or plastic mesh as indicated by Project Representative. Maintain temporary fence during construction and remove only when construction is complete.

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1. For plastic mesh, line posts space at eight feet maximum. Set posts vertically to minimum 18 inches depth. Posts may be driven provided method of driving does not damage posts. Ensure that posts do not damage tree roots.
2. Where plastic fence is used, secure plastic fencing to posts with nylon zip-straps, minimum three per post. Draw fence material tight and vertical. Where chain link panels are used join panels with manufacturers clamps that require tool removal.
3. With Project Representative's approval, sections of tree protection fencing may be removed temporarily to allow approved short-term construction activities. Reinstall fencing immediately when construction operations permit.

- B. Tree Trunk Protection: Where required tree trunks shall be protected by placing 2 x 4 lumber around the trunk, spaced so that strapping will not come in contact with the tree bark and lumber does not damage branches. Use strapping to hold lumber in place. Secure straps without nailing into or otherwise damaging tree bark.

3.4 SOIL COMPACTION, LOSS, AND DAMAGE WITHIN THE CRITICAL ROOT ZONE

- A. Protection against soil compaction within the CRZ may include but will not be limited to the following methods:

1. Application of a minimum 6-inch thick layer of mulch (or wood chips salvaged from clearing and grubbing operations) within the CRZ. Replenish mulch as necessary to maintain a 6-inch depth. Do not place mulch within 6 inches of tree trunks. Where mulch is to be removed following project completion it should be underlaid with a porous geotextile.
2. Ground protection mats, such as: timber or steel planking, construction mats, 1/2 inches thick CDX grade (or better) plywood, or brush for protection of surface roots and vegetation from equipment.
3. Where equipment operating within the CRZ exceeds 12,000 lbs use a 6-inch layer of mulch overlaid with ground protection mats described above.

- B. Protection of soils against erosion and loss within the critical root zone of trees may require application of mulch, wood chips, ground protection mats, or landscape fabric at the request of the Project Representative.

- C. Noxious Materials: Protect soils from damage caused by runoff or spillage of noxious materials while operating, mixing, placing, or storing construction materials and equipment; this includes washout of concrete mixing vessels, dewatering operations, equipment cleanup, maintenance, and service; ponding, erosion, or excessive wetting may incur a Stop-Work order at the discretion of the Project Representative.

3.5 TRENCHING, DIGGING, TUNNELING, AND GRADING WITHIN THE CRITICAL ROOT ZONE:

- A. Disturbance to soils and impacts to roots within the CRZ may require any of, and will not be limited to, the following methods, practices, and restrictions:

1. Maintain existing grade within CRZ of trees unless otherwise directed.

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- a. Lowering grades (cutting): Where existing grade is above new finish grade shown around trees, carefully excavate within CRZ to new grade. Document roots exposed in this process with photographs to be shared with project Representative.
  - b. Raising grades (filling): Where existing grade is raised within the CRZ to greater than 4 inches above existing grade these roots shall be considered damaged by smothering. Methods to increase air exchange of tree roots within these areas may be required. Examples of such methods may include and will not be limited to:
    - 1) Application of a 6 inch or thicker layer of large clean aggregate (2 inches by 4 inches or larger) covered with landscape fabric below fill material to maintain large pore space.
    - 2) Selection of a fill material with high porosity and minimal compressibility, which may include mulch. Compaction will not be required except as required by structural load requirements, to limit soil compaction.
2. Alternative excavation methods that minimize root damage may be required. These may include but are not limited to: hand digging, horizontal boring, use of an air excavation tool, or other methods as otherwise deemed necessary by the Project Representative.
- B. Only limited intrusions into tree CRZ zones will be allowed as shown on the plans and with the approval of the Project Representative. Where trenching for utilities or irrigation is required within CRZ's of trees the following may be required:
1. No cutting of roots greater than two inches diameter. Tunnel under or around roots by drilling, auger boring, air excavation, or digging by hand.
  2. Where necessary for installation, cut roots with sharp pruning instruments flush with the edge of the trench or tunnel; do not break or chop.
  3. Avoid hitting roots with heavy equipment. Roots that are ripped by equipment should be excavated by hand, photographed, kept moist with mulch or burlap layers, and inspected by the Project Representative.
  4. Pile excavated soil outside of the CRZ of residual trees and return area to original grade upon completion of work.
  5. Cover exposed roots with soil as soon as possible or at the end of each day; the soil compacted to the original firmness only; and, watered when conditions are dry.
  6. Tree root pruning or other tree root treatments may be required as directed by the Project Representative.
  7. Root painting is not permitted.
- 3.6 STEM AND BRANCH PRUNING:
- A. Any unnecessary cutting, breaking, skinning, or bruising of bark; breaking of branches and foliage; damage or clearing of vegetation in the work area will not be permitted. Where permitted, stem and branch pruning must follow ANSI A300 Standards (including Part 1 and Part 5).
  - B. Temporarily tie-up of low limbs is permitted where designated by the project representative.
  - C. All final pruning cuts shall be made in branch tissue close to the trunk or parent limb, without cutting into the branch bark ridge or branch collar and without leaving a stub. Flush cuts to the tree trunk that remove the branch collar are unacceptable. Flush cuts result in a larger wound and expose trunk tissues to the possibility of decay.

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- D. All significant tree pruning must have prior approval of Project Representative. An approved Arborist may be required, at the Contractors expense, for extensive or technically challenging pruning activities. Such requirements will be made explicit to the Contractor prior to the start of work.
- E. Only proper branch pruning techniques will be accepted. Improperly pruned trees could be irreparably damaged and are subject to section 3.7 DAMAGE TO TREES AND TREE REPLACEMENT.

3.7 DAMAGE TO TREES AND TREE REPLACEMENT:

- A. Should any tree or vegetation designated to remain be damaged in the course of construction activities immediately notify the Project Representative for inspection and direction for remedy.
- B. Remedies for damage will, at the Owner's discretion, require removal and disposal of the damaged tree(s) and be one of the following, at the discretion of the Project Representative.
  - 1. Compensate the Owner in cash or as a credit to the contract for up to the full value of the damaged tree, as appraised by an ISA certified Arborist according to the latest edition of the "Guide for Plant Appraisal".
  - 2. Replace each damaged tree under 6 inches diameter at breast height measurement with one replacement tree of 1-3/4 inches caliper measure. Replace each damaged tree over 6 inches diameter at breast height measurement with one replacement tree of 1-3/4 inches caliper measure for each 6 inches of diameter at breast height measure of the damaged tree. The new trees may or may not be the same species, at the discretion of the Project Representative. Select nursery stock, plant, and maintain as specified in Section 1.4 QUALITY ASSURANCE.
  - 3. For identified old-growth trees specified to remain, the Project Representative may be provided alternative remediation requirements from Parks Stewardship staff above and beyond requirements of 3.7.B.1 and 3.7.B.2.
- C. Notify Project Representative in any case where construction called for in the contract documents cannot be completed without damage to trees identified to remain. Approval of the Project Representative is required prior to beginning construction described in the contract documents that might damage a tree designated to remain. Any tree designated to remain which is damaged without Project Representative's written approval, even if damage is necessary to complete the work, will subject the Contractor to remedies described in section 3.7 B above.

END OF SECTION

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SECTION 016000 – PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 COMMISSION FURNISHED ITEMS

- A. The Commission furnishes no items, except for one Electrical Vehicle Charging Station – Power Charge Commercial Energy Series 40A electrical vehicle charging station. Contractor to provide all necessary work and related connections to result in a fully functional system.

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.

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1.5 SUBSTITUTIONS

- A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 15 calendar 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 provides sustainable design characteristics that specified product provided.
    - e. Requested substitution will not adversely affect Contractor's construction schedule.
    - f. Requested substitution has received necessary approvals of Authorities Having Jurisdiction.
    - g. Requested substitution is compatible with other portions of Work.
    - h. Requested substitution has been coordinated with other portions of Work.
    - i. Requested substitution provides specified warranty.
    - j. 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")

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- A. Proposed equipment to be considered "or equal" will necessitate written approval by the Engineer 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 Engineer 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 Engineer 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

**LEWIS & CLARK TRAIL STATE PARK  
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SECTION 017329 – CUTTING AND PATCHING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes procedural requirements for cutting and patching.

1.2 DEFINITIONS

- A. Cutting: Removal of in-place construction necessary to permit installation or performance of other Work.
- B. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of other Work.

1.3 SUBMITTALS

- A. Cutting and Patching Proposal: For work not clearly indicated as cutting and patching on the drawings or specifications, submit a proposal describing procedures at least seven (7) days before the time cutting and patching will be performed, requesting approval to proceed. Include the following information, as applicable:
  - 1. Extent: Describe cutting and patching, show how they will be performed, and indicate why they cannot be avoided.
  - 2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building's appearance and other significant visual elements.
  - 3. Products: List products to be used and firms or entities that will perform the Work.
  - 4. Utility Services and Mechanical/Electrical Systems: List services/systems that cutting and patching procedures will disturb or affect. List services/systems that will be relocated and those that will be temporarily out of service. Indicate how long services/systems will be disrupted.
  - 5. Structural Elements: Where cutting and patching involve adding reinforcement to structural elements, submit details and engineering calculations showing integration of reinforcement with original structure.
  - 6. Roofing Elements: Where cutting and patching involve cutting and patching roofing. Submit product data and samples of roofing material to be used.
  - 7. Noise and Dust Protection Plan.
- B. Architect or Engineer's Approval: Obtain approval of cutting and patching proposal before cutting and patching. Approval does not waive right to later require removal and replacement of unsatisfactory work.



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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. Mechanical systems piping and ducts.
  - 3. Electrical wiring systems.
- 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.

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**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.

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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.
    - c. 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. Continue repainted area to next internal or external corner, so entire surface plane receives a finish coat of paint. Provide additional coats until patch blends with adjacent surfaces.
  3. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
  4. 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

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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

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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 containing the following data for each mechanical, 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 and construction activities.

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- B. Final payment: No more than 95 percent until As-Built Drawings received. Payment made after receipt and acceptance of drawings by Project Representative. Lack of As-Built Drawings will not be a cause for contract extensions.

1.3 SPECIAL TOOLS

- A. Deliver special tools required for maintenance and adjustment of equipment to Project Representative upon completion and before final acceptance of Project.

1.4 SPARE MATERIALS AND PARTS

- A. Before final acceptance, deliver spare materials, parts and other similar items to storage locations specified by Project Representative.

1.5 CERTIFICATES AND PERMITS

- A. Submit signed original certificates of compliance and final approval from Authorities Having Jurisdiction.

1.6 OUTSTANDING DOCUMENTS

- A. Expedite and submit outstanding administrative documents including outstanding cost proposals, Change Orders, etc.

1.7 PHOTOGRAPHIC DOCUMENTATION

- A. Before final acceptance of this Project, provide one (1) copies of the photo key plan, prints of the photos, and CD or thumb drive of photos.

1.8 PRIOR OCCUPANCY

- A. Reference General Conditions.
- B. Commission has the right to occupy completed portions of Project prior to final acceptance, and such occupation is not an acceptance of Project. Prior to occupancy, Project Representative and Contractor mutually agree to a date for prior occupancy; the area to be occupied; that occupancy is commencing within the requirements of applicable codes and ordinances; that endorsements from insurance companies, as necessary to maintain full insurance of Project regardless of prior occupancy, have been obtained; and that other necessary provisions are completed.
- C. The Project Representative will inspect areas designated for prior occupancy and issue a letter of acceptance or provide a list of deficiencies to be corrected to Contractor. Correct deficiencies prior to date of occupancy.

1.9 SUBSTANTIAL COMPLETION

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- A. Reference General Conditions.
  - B. Notify Project Representative in writing a minimum of seven (7) days in advance of the scheduled date of completion. Project Representative will conduct a "pre-final" inspection and formulate a final punchlist of Work items to be completed prior to final inspection. Project Representative will establish the date of substantial completion based on pre-final inspection findings. Following this inspection, Project Representative will either issue notice of substantial completion or advise the Contractor of deficient items which must be corrected prior to issuance of substantial completion.
- 1.10 DAMAGE TO FACILITIES, ROADS, VEGETATION OR PROPERTY
- A. During the course of construction, should any park facility be damaged by the Contractor's actions, operations or neglect, repair any such damages to their original condition, as acceptable to the Project Representative, at no cost to the Commission.
  - B. Repair, restore or replace any park roads, vegetation or property damaged by the Contractor to the original condition at the time construction began. Repair or replace trees and vegetation indicated to remain, which has been damaged by construction operations, in a manner acceptable to the Project Representative.
- 1.11 FINAL CLEAN-UP
- A. Upon completion of the Work and prior to final inspection and acceptance, clean up the entire construction site and all grounds occupied by the Contractor in connection with the Work.
  - B. Fine graded, rake clean and smooth all worksites and disturbed areas. Remove from the park rubbish, surplus and discarded materials, falsework, temporary structures, equipment, and debris.
  - C. Leave all phases of the Project clean and ready for public use prior to final acceptance.
  - D. Inspect all materials and surfaces for damage, scratches, marring, untreated ends of sawcuts, etc. and repair to original or intended condition.
- 1.12 FINAL INSPECTION AND ACCEPTANCE
- A. Reference General Conditions.
  - B. Notify Project Representative in writing when Work, including punchlist items, has been completed.
  - C. Project Representative will schedule and conduct a final inspection to verify that outstanding Work items are complete.
  - D. Owner will establish the date of final acceptance based on the results of final inspection. Complete/correct any items identified as outstanding during final inspection prior to final acceptance of Project.

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PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION



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SECTION 024119 - SELECTIVE STRUCTURE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. The contractor is responsible for ascertaining the existing conditions and the work required to complete the work of this section satisfactorily.
2. This Section requires the selective removal and salvage or subsequent off-site disposal of the following
  - a. Portions of existing building structure and finishes indicated on drawings and as required to accommodate new work
  - b. Removal of designated building equipment and fixtures
  - c. Removal and salvage of designated construction and site improvements
  - d. Identification of utilities
  - e. Removal and protection of existing fixtures, materials, and equipment items indicated "salvage."
3. The Owner will remove some loose equipment and stored material in the project area, prior to the contractor taking possession of the site. All substrates and building conditions will be maintained in the condition as visible during the bid period; the contractor shall include all necessary costs to improve or modify the substrates to achieve the work shown in the construction documents. Contractors shall coordinate with the finish trades (Framing & Gypsum Board) to complete all substrate improvement necessary to achieve finish tolerances.
4. Existing construction documents for the original construction of the Building are available for review by contractors. Conditions that are apparent, reasonably inferable, or disclosed in the available documents shall not be considered "unforeseen conditions" as basis for contractor claims for cost or time extensions. Documents are available for review at the offices of the Owner, and the Design Team.

1.2 DESIGN REQUIREMENTS

- A. The temporary support and protection system and means and methods for same will be selected by the Contractor. The use of vibratory and impact equipment will not be permitted. Design temporary support and protection system based on the dead loads, live loads, construction loads, sequence of construction, and other miscellaneous loads that are anticipated. Contractor is responsible for determining criteria and properties for the design and construction of the temporary supports.
- B. General: The stability and integrity of the structure during construction shall be maintained at levels generally acceptable within the construction industry by the use of bracing, shoring, and underpinning. In no case shall the structure be allowed to become unsafe or unstable during construction.

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- C. Bracing and Shoring for Structures:
  - 1. The bracing and shoring systems required to provide temporary support of a structure or portions of a structure, during construction shall be designed to support the dead, live, soil, earthquake and wind loads that may be imposed on the structure during construction in accordance with industry standards and generally accepted engineering principles.
  - 2. The proposed bracing and shoring systems shall have foundations designed for allowable soil bearing pressures in accordance with the Geotechnical investigation prepared for the Project.

1.3 DEFINITIONS

- A. Remove: Detach items from existing construction and legally dispose of them off-site, unless indicated to be removed and salvaged or removed and reinstalled.
- B. Remove and Salvage: Detach items from existing construction and deliver them to Owner ready for reuse.
- C. Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.
- D. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.4 MATERIALS OWNERSHIP

- A. Historic items, relics, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, antiques, and other items of interest or value to Owner that may be encountered during selective demolition remain Owner's property. Carefully remove and salvage each item or object in a manner to prevent damage and deliver promptly to Owner.

1.5 SUBMITTALS

- A. Qualification Data: For demolition firm, professional engineer.
- B. Provide structural shoring and temporary works plan, stamped and signed by a professional engineer licensed in the State of Washington. Shoring plan will define required shoring and temporary support for the work of the project.
  - 1. Submit drawings and details for the temporary works under loading conditions described in Section 1.3 and as anticipated for the duration of construction. Drawings must include general layout, member sizes, connection details and construction sequence for bracing, shoring and underpinning. No work related to bracing, shoring or underpinning shall take place until the Architect have reviewed the submittal
  - 2. Submit structural stability analysis and other design calculations for bracing, shoring and underpinning showing member stresses and connections due to imposed loads. Provide Code checks confirming that the design meets current Code requirements & Standards

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- C. Inventory: After selective demolition is complete, submit a list of items that have been removed and salvaged.

1.6 QUALITY ASSURANCE

- A. Design calculations and drawings of the proposed bracing, shoring, and underpinning of the structure shall be prepared, stamped, and signed by a licensed Professional Engineer registered in the State of Washington
- B. Demolition Firm Qualifications: An experienced firm that has specialized in demolition work similar in material and extent to that indicated for this Project. Company specializing in performing the Work of this Section with minimum three (3) years experience.
- C. Regulatory Requirements:
  - 1. Comply with governing EPA notification regulations before beginning selective demolition.
  - 2. Comply with E.P.A. and OSHA regulations throughout the work of this section
  - 3. Comply with Clean Air Act (CAA) requirements; Section 608
  - 4. Comply with hauling and disposal regulations of authorities having jurisdiction.
  - 5. Conform to applicable code for demolition of structure, safety of adjacent structures, dust control and disposal
  - 6. Obtain required permits from authorities
  - 7. Notify affected utility companies before starting work and comply with their requirements
  - 8. Conform to procedures applicable when discovering hazardous or contaminated materials
- D. Standards: Comply with ANSI A10.6 and NFPA 241.
- E. Pre-demolition Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Review methods and procedures related to selective demolition including, but not limited to, the following:
  - 1. Inspect and discuss condition of construction to be selectively demolished.
  - 2. Review structural load limitations of existing structure.
  - 3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
  - 4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
  - 5. Review areas where existing construction is to remain and requires protection.
    - A. Condition of Structures: Owner assumes no responsibility for actual condition of items or structures to be demolished. Conditions existing at time of inspection for bidding purposes will be maintained by Owner insofar as practicable. However, minor variations within structure may occur by Owner's removal and salvage operations prior to start of selective demolition work.
    - B. Partial Demolition and Removal:
      - 1. Items indicated to be removed but of salvageable value to Contractor may be removed from structure as work progresses. Storage or sale of removed items on site will not be permitted.

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2. Items to be removed by the Contractor to be retained by the Owner shall be designated “remove and retain”. Remove to on-site location as directed.

1.7 PROJECT CONDITIONS

- A. Coordinate with Owner’s operations involving move-out, salvage, reclamation and recycling activities.
- B. Condition of Structures: Owner assumes no responsibility for actual condition of items or structures to be demolished. Conditions existing at time of inspection for bidding purposes will be maintained by Owner insofar as practicable. However, minor variations within structure may occur by Owner's removal and salvage operations prior to start of selective demolition work.
- C. Partial Demolition and Removal:
  1. Items indicated to be removed but of salvageable value to Contractor may be removed from structure as work progresses. Storage or sale of removed items on site will not be permitted
  2. Items to be removed by the Contractor to be retained by the Owner shall be designated “remove and retain”. Remove to on-site location as directed.
- D. Protections:
  1. Provide temporary barricades and other forms of protection to protect Owner's personnel and general public from injury due to selective demolition work
  2. Provide interior and exterior shoring, bracing, or support to prevent movement, settlement, or collapse of structure or element to be demolished and adjacent facilities or work to remain
  3. Protect existing finish work that is to remain in place and becomes exposed during demolition operations
  4. Protect floors and roofing with suitable coverings when necessary
  5. Provide temporary weatherproof closures for exterior openings resulting from demolition work
  6. Provide air and dust proof containment barriers at locations where work occurs, protect remainder of the building from contamination, or nuisance caused by residual effects of demolition and construction procedures
  7. Remove protections at completion of work.
- E. Damages: Promptly repair damages caused to adjacent facilities by demolition work.
- F. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
  1. Before selective demolition, Owner will remove the following items:
    - a. Loose furnishings, fixtures, and minor miscellaneous equipment.

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- G. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- H. Hazardous Materials are NOT present:
  - 1. Inspection and testing for certain materials has been performed. The results are included in the separate report provided following this section.
  - 2. If suspected hazardous materials are encountered, the Contractor shall immediately notify the Owner and Architect, and handle them in accordance with all applicable local, state, and federal regulations, protecting site, workers and surroundings from contamination
  - 3. If hazardous materials are encountered, the Contractor shall immediately notify the Owner and Architect, and handle them in accordance with all applicable local, state, and federal regulations, protecting site, workers and surroundings from contamination
  - 4. Identification: It is the Contractor's responsibility to bring to the attention of the Architect suspected asbestos-containing materials which may be encountered as the work proceeds. Architect will notify Owner. Exploratory operations and laboratory tests will be made by the Owner's consultant if materials that may contain asbestos are encountered
  - 5. Lead Paint and similar materials: Contractor shall provide lead containing materials identification, control, containment, abatement and disposal previously identified or encountered during the course of demolition and construction, included in the Cost of the Work. Contractor shall be responsible for a program to control lead exposure to workers, and ensure that no lead exposure occurs to the general public
  - 6. Contractor shall provide and include the cost of containment, temporary storage, neutralizing and proper disposal of all hazardous materials such as solvents, acids, paint strippers and cleaners used in the course of performing the Work
  - 7. Contractor shall provide and include the cost of removal and delivery to the Owner of any PCB-containing fluorescent lamp ballasts encountered during the course of demolition and construction.
- I. Storage or sale of removed items or materials on-site is not permitted.
- J. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

1.8 WARRANTY

- A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS

2.1 MATERIALS FOR SHORING AND BRACING

- A. Materials for shoring and bracing shall be undamaged, high quality materials. Remove and replace any materials that become damaged or are otherwise unusable.

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**PART 3 - EXECUTION**

**3.1 EXAMINATION**

- A. Verify that utilities have been disconnected and capped.
- B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
- C. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.
- D. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.
- E. 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 during selective demolition operations.
- F. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs.
  - 1. Before selective demolition or removal 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.
- G. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

**3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS**

- A. Existing Services/Systems: Maintain services/systems indicated to remain and protect them against damage during selective demolition operations.
- B. Service/System Requirements: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.
  - 1. Arrange to shut off indicated utilities with utility companies.
  - 2. If services/systems are required to be removed, relocated, or abandoned, before proceeding with selective demolition provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
  - 3. Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing.
    - a. Where entire wall is to be removed, existing services/systems may be removed with removal of the wall.

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3.3 PREPARATION

- A. Contractors are responsible for familiarizing themselves with the condition of the project site.
- B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
  - 1. Comply with requirements for access and protection specified in Division 01 Section "Temporary Facilities and Controls."
- C. Locate, identify, stub off, and disconnect utility services not indicated to remain. Provide minimum of 72 hours advance notice to Owner if shutdown of service is necessary during changeover.
- D. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent facilities to remain.
  - 1. Provide protection to ensure safe passage of people around selective demolition.
  - 2. Provide temporary partitions and barriers to prevent the spread of dust, odors and noise. Erect and maintain dust-proof partitions and closures as required to prevent spread of dust or fumes Seal all seams with appropriate tape material.
  - 3. Protect existing materials, existing landscaping materials, appurtenances, structures and utilities which are not to be demolished.
  - 4. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
  - 5. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
  - 6. Cover and protect building improvements, furniture, equipment, and fixtures from soilage or damage when demolition work is performed in areas where such items have not been removed.
  - 7. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Division 01.
- E. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
  - 1. Strengthen or add new supports when required during progress of selective demolition.

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3.4 SELECTIVE DEMOLITION, GENERAL

- A. Install temporary support and protection system in accordance with reviewed shop drawings and submittal documents.
  
- B. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Include all work necessary to complete the new work shown in all documents within the contract documents, including but not limited to, Architectural, Hazardous Material Abatement, Civil, Structural, Mechanical, and Electrical. Work of this section is not limited to areas indicated in the demolition drawings. Use methods required to complete the Work within limitations of governing regulations and as follows:
  - 1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
  - 2. Provide services for effective air, soil and water pollution controls and worker protection as required by authorities having jurisdiction.
  - 3. Spread out equipment and materials loads across structure and promptly remove debris to avoid imposing excessive loads on supporting walls, floors, or framing.
  - 4. Conduct demolition to minimize interference with adjacent spaces and properties. Utilize demolition procedures that minimize disruption to the surrounding areas and activities. Conduct operations with minimum interference to public or private accesses. Maintain protected egress and access at all times. Provide all necessary measures to ensure no contamination of the existing building systems, including the building air intakes and exhausts.
  - 5. Remove portions of the building indicated using methods as required to provide high quality substrates for work of subsequent phases. Tolerances within 1/8" of required substrate for new finishes shall be deemed acceptable for the work of this section.
  - 6. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
  - 7. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
  - 8. For interior slabs, use removal methods that will not crack or structurally disturb adjacent slabs or partitions. Use power saw where possible.
  - 9. Demolish concrete and masonry in small sections. Cut concrete and masonry at junctures with construction to remain using power-driven masonry saw or hand tools. No over-cuts allowed.
  - 10. Keep work sprinkled with water to minimize dust. Provide hoses and water connections for this purpose.
  - 11. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain fire watch and portable fire-suppression devices during flame-cutting operations.
  - 12. Maintain adequate ventilation when using cutting torches.
  - 13. Cease operations and notify Owner, and Architect/Engineer immediately if safety of structure appears to be endangered. Take precautions to support structure until determination is made for continuing operations.



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14. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
15. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
16. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
17. Dispose of demolished items and materials promptly. Comply with requirements in Division 01 Section "Construction Waste Management and Disposal."

C. Removed and Reinstalled Items:

1. Clean and repair items to functional condition adequate for intended reuse. Paint equipment to match new equipment.
2. Pack or crate items after cleaning and repairing. Identify 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. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

D. Removal of Bracing and Shoring

1. Do not unequally or eccentrically load the temporary support system and exercise extreme care in the removal of temporary support system to ensure a slow and even release, and to avoid creating unequal pressures and stresses.
2. Bracing and shoring shall not be removed until the new members have acquired sufficient strength to support their weight and the loads superimposed thereon safely.

E. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

- A. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals, using power-driven saw, then remove concrete between saw cuts.
- B. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, and then remove masonry between saw cuts. No over-cuts allowed.
- C. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, then break up and remove.

3.6 DISPOSAL OF DEMOLISHED MATERIALS

- A. General: Except for items or materials indicated to be recycled, reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.

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1. Do not allow demolished materials to accumulate on-site. Remove demolished materials from site promptly.
  2. Remove and promptly dispose of contaminated, vermin infested or dangerous materials encountered, per regulatory requirements
  3. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
  4. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
- B. Salvaged Items to be Retained and Re-Used in the Work: Where indicated as "Remove and Retain," or "Relocate", carefully remove indicated items, clean, and reuse as indicated on the drawings and in other sections of the specifications.
- C. Burning: Do not burn demolished materials.
- D. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

3.7 CLEANING

- A. General: Upon completion of demolition work, remove tools, equipment, and demolished materials from site. Remove protections and leave interior areas broom clean.
- B. Repair demolition performed in excess of that required. Return elements of construction and surfaces to remain to condition existing prior to start of operations. Repair adjacent construction or surfaces soiled or damaged by selective demolition work.
- C. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION 024119

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SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section specifies cast-in place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:
  - 1. Concrete floor slab.
  - 2. Concrete slabs-on-grade in building to be Honed Concrete, decorative finish concrete floor slab.
  - 3. Underslab Vapor Retarders

1.2 DEFINITIONS

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

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments.
  - 1. Indicate amounts of mixing water to be withheld for later addition at Project site.
- C. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.
- D. Material Certificates: For each of the following, signed by manufacturers:
  - 1. Cementitious materials.
  - 2. Admixtures.
  - 3. Curing compounds.
  - 4. Bonding agents.
  - 5. Adhesives.
  - 6. Semirigid joint filler.
  - 7. Repair materials.
  - 8. Vapor retarders.

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1.4 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed concrete Work similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in service performance.
- B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94 requirements for production facilities and equipment.
  - 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- C. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from one source, and obtain admixtures through one source from a single manufacturer.
- D. Source limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, each aggregate from one source, and each admixture from the same manufacturer.
- E. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
  - 1. ACI 301, "Specification for Structural Concrete,"
  - 2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

1.5 DELIVERY, STORAGE, AND HANDLING

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

PART 2 - PRODUCTS

2.1 FORM-FACING MATERIALS

- A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
  - 1. Plywood, metal, or other approved panel materials.
- B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.
- C. Forms for Cylindrical Columns, Pedestals, and Supports: Metal or glass-fiber-reinforced plastic tubes that will produce surfaces with gradual or abrupt irregularities not exceeding specified formwork surface class. Provide units with sufficient wall thickness to resist plastic concrete

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loads without detrimental deformation.

- D. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum.
- E. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.
- F. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
  - 1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
- G. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
  - 1. Furnish units that will leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.

2.2 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.
- B. Welded Reinforcement Bars: ASTM A 706/A 706M, Grade 60, deformed.
- C. Plain-Steel Welded Wire Reinforcement: ASTM A 185, plain, fabricated from as-drawn steel wire into flat sheets.

2.3 REINFORCEMENT ACCESSORIES

- A. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
  - 1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.

2.4 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:
  - 1. Portland Cement: ASTM C 150, Type I may be Supplemented with the following:
    - a. Fly Ash: ASTM C 618, Class F.

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- B. Normal-Weight Aggregates: ASTM C 33, Class 5S coarse aggregate or better, graded. Provide aggregates from single source with documented service record data of at least 10 years' satisfactory service in similar applications and service conditions using similar aggregates and cementitious materials.
  - 1. Maximum Coarse-Aggregate Size: 3/4 inch
  - 2. Gradation: Uniformly graded.
- C. Normal-Weight Fine Aggregate: ASTM C 33, manufactured or natural sand, from same source for entire Project. Free of materials with deleterious reactivity to alkali in cement.
- D. Water: Potable, complying with ASTM C 94/C 94M except free of wash water from mixer washout operations.

2.5 ADMIXTURES

- A. Air-Entraining Admixture: ASTM C 260.
- B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
  - 1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
  - 2. Retarding Admixture: ASTM C 494/C 494M, Type B.
  - 3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
  - 4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
  - 5. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.
- C. Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete and complying with ASTM C 494/C 494M, Type C.

2.6 VAPOR RETARDERS

- A. Plastic Vapor Retarder: ASTM E 1745, Class A. Include manufacturer's recommended adhesive or pressure-sensitive tape.
  - 1. Available Products:
    - a. Stego Industries, LLC; Stego Wrap, 15 mils.
    - b. Fortifiers Corporation; Moistop Ultra A.
    - c. Raven Industries Inc.; Vapor Block 15.
    - d. Reef Industries, Inc.; Griffolyn Type-105.
    - e. W.R. Meadows, 15mils
    - f. Viper Vapor Check II, 15 mils
- B. Maintain permeance of less than 0.01 Perms as tested in accordance with mandatory conditioning tests per ASTM E1745 (field condition permeance rating).

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- C. Granular Fill: All below slab gravel fill is to meet the requirements stated in Section 9-03.9(3)-Crushed Surfacing in the WSDOT Standards. Comply and verify with the requirements of the civil engineering documents. Reference requirements of the geotechnical investigation report.

2.7 CURING MATERIALS

- A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
- B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.
- C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- D. Water: Potable.
- E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, 18 to 25 percent solids, nondissipating. Dayton Superior Corporation; Safe Cure and Seal (J-19), Euclid Super Diamond Clear VOX, or equal. Certified by curing compound manufacturer to not interfere with bonding of floor covering or coatings.
  - 1. Approved Manufacturer: W.R. Meadows

2.8 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.
- B. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

2.9 REPAIR MATERIALS

- A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.
  - 1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
  - 2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
  - 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by underlayment manufacturer.
  - 4. Compressive Strength: Not less than 4000 psi at 28 days when tested according to ASTM C 109/C 109M.
- B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor

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elevations.

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

2.10 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.
- B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
  1. Fly Ash: As Indicated.
- C. Limit water-soluble, chloride-ion content in hardened concrete to 0.06 percent by weight of cement.
- D. Admixtures: Use admixtures according to manufacturer's written instructions.
  1. Use water-reducing high-range water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
  2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
  3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.

2.11 CONCRETE MIXTURES FOR BUILDING ELEMENTS

- A. Slabs: Proportion normal-weight concrete mixture as follows:
  1. Minimum Compressive Strength: 3,000 psi.
  2. Minimum Cementitious Materials Content: 540 lb/cu. yd.
  3. Slump Limit: 4 inches, plus or minus 1 inch.
  4. Air Content: 3.5 percent, plus or minus 1 percent at point of delivery for 3/4-inch nominal maximum aggregate size.
  5. Air Content: Do not allow air content of troweled interior finished floors to exceed 3 percent.
  6. Maximum Water-Cementitious Materials Ratio: 0.45



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2.12 FABRICATING REINFORCEMENT

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

2.13 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.
  - 1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 FORMWORK

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C. Limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows:
  - 1. Class A, 1/8 inch for smooth-formed finished surfaces.
  - 2. Class B, 1/4 inch for rough-formed finished surfaces.
- D. Construct forms tight enough to prevent loss of concrete mortar.
- E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
  - 1. Install keyways, reglets, recesses, and the like, for easy removal.
  - 2. Do not use rust-stained steel form-facing material.
- F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.
- G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous

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locations.

- H. Chamfer exterior corners and edges of permanently exposed concrete.
- I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.
- J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

**3.2 EMBEDDED ITEMS**

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
  - 1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."

**3.3 REMOVING AND REUSING FORMS**

- A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete, if concrete is hard enough to not be damaged by form-removal operations and curing and protection operations are maintained.
- B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.
- C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

**3.4 VAPOR RETARDERS**

- A. Plastic Vapor Retarders: Place, protect, and repair vapor retarders according to ASTM E 1643 and manufacturer's written instructions.
  - 1. Lap joints 6 inches and seal with the manufacturer's recommended tape.
  - 2. Do not use stakes to hold retarder in place.
  - 3. Use manufacturer's mastic sealant at locations difficult to seam tape for full seal. Do not install mastic in the rain.

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4. Repair/patch all punctures with additional layer of vapor retarder. Tape entire perimeter of patch with the manufacturer's recommended tape.
5. Seal entire perimeter of vapor retarder at backside of perimeter stem wall assembly.

3.5 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
  1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.
- D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- E. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing or 6" minimum. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.6 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
  1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
  2. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
  3. Joints shall be at least 25 percent of the slab thickness or at one inch deep minimum.
- C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:
  1. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks. Re-saw all joints with beveled edge blade to ease edges at all saw-cut joints.

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- D. Isolation Joints in Slabs-on-Grade: install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, existing slabs, and other locations, as indicated.
1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface, unless otherwise indicated.
  2. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface where joint sealants, specified in Division 7 Section "Joint Sealants," are indicated.
  3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.
- E. Exposed Concrete Saw Cut Joint: Reference drawings for saw cut locations and saw blade profile and contractor submitted layout drawings.

3.7 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.
- B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.
- C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.
1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
- D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
  2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
  3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.
- E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
  2. Maintain reinforcement in position on chairs during concrete placement.

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3. Screed slab surfaces with a straightedge and strike off to correct elevations.
4. Slope surfaces uniformly to drains where required.
5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

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

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

G. Hot-Weather Placement: Comply with ACI 301, 305R and as follows:

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

### 3.8 FINISHING FLOORS AND SLABS

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

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

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

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

1. Apply a trowel finish to all interior floor slabs.
2. Finish surfaces to the following tolerances, according to ASTM E 1155, for a randomly trafficked floor surface:
  - a. Specified overall values of flatness, F(F) 35; and of levelness, F(L) 25; with minimum local values of flatness, F(F) 24; and of levelness, F(L) 17; for slabs-on-grade.

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- b. Specified overall values of flatness, F(F) 30; and of levelness, F(L) 20; with minimum local values of flatness, F(F) 24; and of levelness, F(L) 15; for suspended slabs.
- D. Broom Finish: Apply a broom finish to exterior concrete slabs, and elsewhere as indicated.
  - 1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.
- E. Slab Finish at locations to receive Sealed or Painted Finish: Apply towel finish as specified above. After concrete has completely cured, apply sealer or paint floor finish. Patch or prepare the substrate as required by sealer and/or floor paint product requirements.

**3.9 MISCELLANEOUS CONCRETE ITEMS**

- A. Filling In: Fill in holes and openings left in concrete structures, unless otherwise indicated, after work of other trades is in place. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.
- B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

**3.10 CONCRETE PROTECTING AND CURING**

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.
- D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.
- E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
  - 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:

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- a. Water.
  - b. Continuous water-fog spray.
  - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
- a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
  - b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
  - c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies will not interfere with bonding of floor covering used on Project..
3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
- a. After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound will not interfere with bonding of floor covering used on Project.
4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.11 JOINT FILLING

- A. Prepare, clean, and install joint filler according to manufacturer's written instructions.
  1. Defer joint filling until concrete has aged at least one month(s). Do not fill joints until construction traffic has permanently ceased.
- B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.
- C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.12 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.
- B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part Portland cement to two and one-half parts fine aggregate passing a No. 16 sieve, using only enough water for handling

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and placing.

- C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension in solid concrete, but not less than 1 inch in depth. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
  2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
  3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.
- D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
  2. After concrete has cured at least 14 days, correct high areas by grinding.
  3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
  4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
  5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
  6. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
  7. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and



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loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

- E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.
- F. Repair materials and installation not specified above may be used, subject to Architect's approval.

END OF SECTION 033000

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SECTION 05 50 00 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Steel framing and supports for applications where framing and supports are not specified in other Sections.
2. Anchors not specified elsewhere.

B. Products furnished, but not installed, under this Section include the following:

1. Loose steel lintels.
2. Anchor bolts, steel pipe sleeves, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.

1.2 PERFORMANCE REQUIREMENTS

A. Thermal Movements: Provide exterior metal fabrications that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

1.3 SUBMITTALS

A. Product Data: For the following:

1. Perforated Metal panel product, if used
2. Paint products.
3. Grout.

B. Shop Drawings: Show fabrication and installation details for metal fabrications.

1. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.
2. Provide templates for anchors and bolts specified for installation under other Sections.
3. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

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- C. Mill Certificates: Signed by manufacturers of stainless-steel sheet certifying that products furnished comply with requirements.
- D. Welding certificates.

1.4 QUALITY ASSURANCE

- A. Qualifications
  - 1. Fabricator: Company specializing in performing the work of this Section with minimum 5 years documented experience
  - 2. Erector: Company specializing in performing the work of this Section with minimum 5 years documented experience
- B. Fabricate structural steel members in accordance with AISC - Specification for the Design, Fabrication and Erection of Structural Steel for Buildings.
- C. Perform work in accordance with AISC-Specification for Architecturally Exposed Structural Steel (AESS) where finished work will be exposed to view.
- D. Welding: Qualify procedures and personnel according to the following:
  - 1. AWS D1.1, "Structural Welding Code--Steel."
  - 2. AWS D1.2, "Structural Welding Code--Aluminum."
  - 3. AWS D1.3, "Structural Welding Code--Sheet Steel."
  - 4. AWS D1.6, "Structural Welding Code--Stainless Steel."
- E. Acceptance: Metal fabrications exposed to view shall be of the highest quality and in accordance with applicable portions of AISC (American Institute of Steel Construction) - Specification for Architecturally Exposed Structural Steel (AESS). Quality of appearance shall be grounds for acceptance or rejection of the work of this section, decisions regarding appearance quality shall be at the discretion of the architect / engineer. Work that is rejected on the grounds of appearance shall be repaired or replaced with no additional cost to Owner.

1.5 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication and indicate measurements on Shop Drawings.
  - 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating metal fabrications without field measurements. Coordinate wall and other contiguous construction to ensure that actual dimensions correspond to established dimensions.
  - 2. Provide allowance for trimming and fitting at site.

1.6 COORDINATION

- A. Coordinate installation of anchorages for metal fabrications. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor

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bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

- B. Coordinate installation of steel weld plates and angles for casting into concrete that are specified in this Section but required for work of another Section. Deliver such items to Project site in time for installation.

**PART 2 - PRODUCTS**

**2.1 METALS, GENERAL**

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces, unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

**2.2 FERROUS METALS**

- A. Steel Plates, Shapes, and Bars: ASTM A 36.
- B. Stainless-Steel Sheet, Strip, Plate, and Flat Bars: ASTM A 666, Type 304.
- C. Stainless-Steel Bars and Shapes: ASTM A 276, Type 304.
- D. Rolled-Steel Floor Plate: ASTM A 786, rolled from plate complying with ASTM A 36 or ASTM A 283, Grade C or D.
- E. Rolled-Stainless-Steel Floor Plate: ASTM A 793.
- F. Steel Tubing: ASTM A 500, cold-formed steel tubing.
- G. Steel Pipe: ASTM A 53, standard weight (Schedule 40), unless another weight is indicated or required by structural loads.
- H. Cast Iron: ASTM A 48/A 48M, Class 30, unless another class is indicated or required by structural loads.

**2.3 NONFERROUS METALS**

- A. Aluminum Plate and Sheet: ASTM B 209, Alloy 6061-T6.
- B. Aluminum Extrusions: ASTM B 221, Alloy 6063-T6, schedule 40 minimum.
- C. Aluminum Castings: ASTM B 26/B 26M, Alloy 443.0-F.

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2.4 FASTENERS

- A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 5, at locations concealed inside of exterior walls. Provide stainless-steel fasteners for fastening aluminum. Select fasteners for type, grade, and class required.
- B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A with hex nuts, ASTM A 563; and, where indicated, flat washers.
- C. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, nuts and, where indicated, flat washers; ASTM F 593 for bolts and ASTM F 594 for nuts, Alloy Group 1.
- D. Anchor Bolts: ASTM F 1554, Grade 36.
  - 1. Provide hot-dip or mechanically deposited, zinc-coated anchor bolts where item being fastened is indicated to be galvanized.
- E. Eyebolts: ASTM A 489.
- F. Machine Screws: ASME B18.6.3.
- G. Lag Bolts: ASME B18.2.1.
- H. Wood Screws: Flat head, ASME B18.6.1.
- I. Plain Washers: Round, ASME B18.22.1.
- J. Lock Washers: Helical, spring type, ASME B18.21.1.
- K. Cast-in-Place Anchors in Concrete: Anchors capable of sustaining, without failure, a load equal to four times the load imposed, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.
  - 1. Threaded or wedge type; galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, hot-dip galvanized per ASTM A 153/A 153M.
- L. Expansion Anchors: Anchor bolt and sleeve assembly with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.
  - 1. Material for Anchors in Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B 633, Class Fe/Zn 5.
  - 2. Material for Anchors in Exterior Locations: Alloy Group 1 stainless-steel bolts complying with ASTM F 593 and nuts complying with ASTM F 594.

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2.5 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- B. Shop Primers: Provide primers that comply with Division 09 painting Sections.
- C. Zinc-Rich Primer: Complying with SSPC-Paint 20 or SSPC-Paint 29 and compatible with topcoat.
  - 1. Use primer with a VOC content of 420 g/L (3.5 lb/gal.) or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
  - 2. Available Products:
    - a. Benjamin Moore & Co.; Epoxy Zinc-Rich Primer CM18/19.
    - b. Carboline Company; Carbozinc 621.
    - c. ICI Devoe Coatings; Catha-Coat 313.
    - d. International Coatings Limited; Interzinc 315 Epoxy Zinc-Rich Primer.
    - e. PPG Architectural Finishes, Inc.; Aquapon Zinc-Rich Primer 97-670.
    - f. Sherwin-Williams Company (The); Corothane I GalvaPac Zinc Primer.
    - g. Tnemec Company, Inc.; Tneme-Zinc 90-97.
- D. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20. If painting work occurs within the interior of the building, paint shall comply with VOC limits stated in Section 01 81 14.
- E. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187. If painting work occurs within the interior of the building, paint shall comply with VOC limits stated in Section 01 81 14.
- F. Nonshrink, Metallic Grout: Factory-packaged, ferrous-aggregate grout complying with ASTM C 1107, specifically recommended by manufacturer for heavy-duty loading applications.
- G. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- H. Concrete Materials and Properties: Comply with requirements in Division 03 Section "Cast-in-Place Concrete" for normal-weight, air-entrained, ready-mix concrete with a minimum 28-day compressive strength of 3000 psi, unless otherwise indicated.

2.6 FABRICATION, GENERAL

- A. Workmanship:
  - 1. Use materials of size and thickness shown or, if not shown, of required size and thickness to produce strength and durability in finished product. Work to dimensions shown or accepted on shop drawings, using proven details of fabrication and support. Use type of materials shown or specified for various components or work
  - 2. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges. Ease exposed edges to a radius of approximately 1/32 inch unless otherwise shown. Form bent metal corners to smallest radius possible without causing grain

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separation or otherwise impairing work.

- B. Form exposed connection with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type shown or, if not shown, socket type flat-head (countersunk) screws or bolts. Provide sufficient backing at screw locations to cover at least three threads.
- C. Provide for anchorage of type suitable for use with supporting structure. Fabricate and space anchoring devices as shown and as required to provide adequate support for intended use.
- D. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- E. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch, unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- F. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- G. Form exposed work true to line and level with accurate angles and surfaces and straight edges.
- H. Weld corners and seams continuously to comply with the following:
  - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
  - 2. Obtain fusion without undercut or overlap.
  - 3. Remove welding flux immediately.
  - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- I. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts, unless otherwise indicated. Locate joints where least conspicuous.
- J. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- K. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
- L. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.
  - 1. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches, with a minimum 6-inch embedment and 2-inch hook, not less than 8 inches from ends and corners of units and 24 inches o.c., unless otherwise indicated.

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2.7 MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.
- B. Fabricate units from steel shapes, plates, and bars of welded construction, unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction retained by framing and supports. Cut, drill, and tap units to receive hardware, hangers, and similar items.
  - 1. Fabricate units from slotted channel framing where indicated.
  - 2. Furnish inserts if units are installed after concrete is placed.
- C. Fabricate supports for operable partitions from continuous steel beams of sizes indicated with attached bearing plates, anchors, and braces as indicated. Drill bottom flanges of beams to receive partition track hanger rods; locate holes where indicated on operable partition Shop Drawings.
- D. Galvanize miscellaneous framing and supports where indicated.
- E. Prime miscellaneous framing and supports with zinc-rich primer where indicated.

2.8 STEEL WELD PLATES AND ANGLES

- A. Provide steel weld plates, shims, spacers and angles not specified in other Sections, for items supported from concrete and/or steel construction as needed to complete the Work.

2.9 MISCELLANEOUS STEEL TRIM

- A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.
- B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.
  - 1. Provide with integrally welded steel strap anchors for embedding in concrete or masonry construction.
- C. Galvanize exterior miscellaneous steel trim.
- D. Prime interior miscellaneous steel trim, with zinc-rich primer.

2.10 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.



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- B. Finish metal fabrications after assembly.
- C. At all steel fabrications that will be exposed to the exterior upon completion of the project, steel fabrications shall be galvanized, and prepared for field painting
- D. At all steel fabrications that will be at interior locations, steel fabrications shall be shop primed.

2.11 STEEL AND IRON FINISHES

- A. Galvanizing: Hot-dip galvanize items as indicated to comply with applicable standard listed below:
  - 1. ASTM A 153, for galvanizing steel and iron hardware.
- B. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with minimum requirements indicated below for SSPC surface preparation specifications and environmental exposure conditions of installed metal fabrications:
  - 1. Exteriors (SPC Zone 1B) and Items Indicated to Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
  - 2. Interiors (SSPC Zone 1A): SSPC-SP 3, "Power Tool Cleaning."
- C. Shop Priming: Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finishes and those to be embedded in concrete, sprayed-on fireproofing, or masonry, unless otherwise indicated. Comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.
  - 1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- C. Field Welding: Comply with the following requirements:
  - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
  - 2. Obtain fusion without undercut or overlap.
  - 3. Remove welding flux immediately.

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4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag bolts, wood screws, and other connectors.
- E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
- F. Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with a heavy coat of bituminous paint.

3.2 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.
- B. Anchor supports for operable partitions securely to and rigidly brace from building structure.
- C. Support steel girders on solid grouted masonry, concrete, or steel pipe columns. Secure girders with anchor bolts embedded in grouted masonry or concrete or with bolts through top plates of pipe columns.
  1. Where grout space under bearing plates is indicated for girders supported on concrete or masonry, install as specified in "Installing Bearing and Leveling Plates" Article.
- D. Install pipe columns on concrete footings with grouted baseplates. Position and grout column baseplates as specified in "Installing Bearing and Leveling Plates" Article.
  1. Grout baseplates of columns supporting steel girders after girders are installed and leveled.

3.3 INSTALLING BEARING AND LEVELING PLATES

- A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of plates.
- B. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with grout.
  1. Use nonshrink grout, either metallic or nonmetallic, in concealed locations where not exposed to moisture; use nonshrink, nonmetallic grout in exposed locations, unless otherwise indicated.
  2. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

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3.4 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
  - 1. Apply by brush or spray to provide a minimum 2.0-mil (0.05-mm) dry film thickness.
- B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Division 09 painting Sections.
- C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION 055000

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SECTION 061000 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Framing with treated and untreated dimensional lumber.
2. Wood blocking, backing, furring, nailers and grounds in equipment bases, walls and ceiling for support of all wall and/or ceiling mounted equipment, fixtures, railings, grab bars, doorstops and miscellaneous surface mounted items.
3. Plywood backing panels.
4. Preservative treatment of wood
5. Pre-fabricated connectors

1.2 DEFINITIONS

A. Exposed Framing: Framing not concealed by other construction.

B. Dimension Lumber: Lumber of 2 inches nominal or greater but less than 5 inches nominal in least dimension.

C. Lumber grading agencies, and the abbreviations used to reference them, include the following:

1. NeLMA: Northeastern Lumber Manufacturers' Association.
2. NLGA: National Lumber Grades Authority.
3. RIS: Redwood Inspection Service.
4. SPIB: The Southern Pine Inspection Bureau.
5. WCLIB: West Coast Lumber Inspection Bureau.
6. WWPA: Western Wood Products Association.

1.3 SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
3. For fire-retardant treatments specified to be High-Temperature (HT) type, include physical properties of treated lumber both before and after exposure to elevated

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temperatures, based on testing by a qualified independent testing agency according to ASTM D 5664.

4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
5. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

B. Fastener Patterns: Full-size templates for fasteners in exposed framing.

C. Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the ALSC Board of Review.

D. Research/Evaluation Reports: For the following, showing compliance with building code in effect for Project:

1. Wood-preservative-treated wood.
2. Fire-retardant-treated wood.
3. Engineered wood products.
4. Power-driven fasteners.
5. Powder-actuated fasteners.
6. Expansion anchors.
7. Metal framing anchors.

#### 1.4 QUALITY ASSURANCE

A. Source Limitations for Engineered Wood Products: Obtain each type of engineered wood product through one source from a single manufacturer.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

A. Stack lumber flat with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

### PART 2 - PRODUCTS

#### 2.1 WOOD PRODUCTS, GENERAL

A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.

1. Factory mark each piece of lumber with grade stamp of grading agency.
2. For exposed lumber indicated to receive a stained or natural finish, omit grade stamp and provide certificates of grade compliance issued by grading agency.

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3. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
4. Provide dressed lumber, S4S, unless otherwise indicated.

2.2 WOOD-PRESERVATIVE-TREATED LUMBER

- A. Preservative Treatment by Pressure Process: AWPA C2, except that lumber that is not in contact with the ground and is continuously protected from liquid water may be treated according to AWPA C31 with inorganic boron (SBX).
  1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
  2. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
  1. For exposed lumber indicated to receive a stained or natural finish, omit marking and provide certificates of treatment compliance issued by inspection agency.
- D. Application: Treat items indicated on Drawings, and the following:
  1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
  2. Wood sills, sleepers, blocking, furring, and similar concealed members in contact with masonry or concrete.
  3. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
  4. Wood framing members that are less than 18 inches above the ground in crawlspaces or unexcavated areas.
  5. Wood floor plates that are installed over concrete slabs-on-grade.

2.3 DIMENSION LUMBER FRAMING

- A. Maximum Moisture Content: 19 percent
- B. Interior framing:
  1. Hem-fir (north); NLGA.
  2. Douglas fir-larch; WCLIB or WWPA.
  3. Spruce-pine-fir; NLGA.
  4. Hem-fir; WCLIB, or WWPA.
  5. Northern species; NLGA.

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6. Western woods; WCLIB or WWPA.
- C. Joists, Rafters, and Other Framing Not Listed Above:
1. Hem-fir (north); NLGA.
  2. Douglas fir-larch; WCLIB or WWPA.
  3. Spruce-pine-fir; NLGA.
  4. Hem-fir; WCLIB or WWPA.
  5. Douglas fir-larch (north); NLGA.

2.4 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
1. Blocking.
  2. Nailers.
  3. Rooftop equipment bases and support curbs.
  4. Cants.
  5. Furring.
  6. Grounds.
- B. For items of dimension lumber size,
1. Hem-fir (north); NLGA.
  2. Spruce-pine-fir; NLGA.
  3. Hem-fir; WCLIB, or WWPA.
  4. Western woods; WCLIB or WWPA.
  5. Northern species; NLGA.
- C. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.
- D. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.
- E. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.5 PLYWOOD BACKING PANELS

- A. Telephone and Electrical Equipment Backing Panels: DOC PS 1, Exposure 1, C-D Plugged, fire-retardant treated, in thickness indicated or, if not indicated, not less than 1/2-inch nominal thickness.
- B. Wall backing for future wall mounted installations: DOC PS 1, Exposure 1, C-D Plugged, fire-retardant treated, 3/8-inch nominal thickness.
- C. Plywood and sheathing products included in the finished project, shall comply with the VOC requirements stated in section 01 81 14

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2.6 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.
  - 1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.
- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Power-Driven Fasteners: NES NER-272.
- D. Wood Screws: ASME B18.6.1.
- E. Lag Bolts: ASME B18.2.1.
- F. Bolts: Steel bolts complying with ASTM A 307, Grade A with ASTM A 563 hex nuts and, where indicated, flat washers.
- G. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.
  - 1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.
  - 2. Material: Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2.

2.7 METAL FRAMING ANCHORS

- A. Galvanized Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 coating designation.
  - 1. Use for interior locations where stainless steel is not indicated.
- B. Bridging: Rigid, V-section, nail-less type, 0.050 inch thick, length to suit joist size and spacing.
- C. Post Bases: Adjustable-socket type for bolting in place with standoff plate to raise post 1 inch above base and with 2-inch- minimum side cover, socket 0.062 inch thick, and standoff and adjustment plates 0.108 inch thick.
- D. Joist Ties: Flat straps, with holes for fasteners, for tying joists together over supports.
  - 1. Width: 3/4 inch.
  - 2. Thickness: 0.050 inch
  - 3. Length: 16 inches.



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- E. Floor-to-Floor Ties: Flat straps, with holes for fasteners, for tying upper floor wall studs to band joists and lower floor studs, 1-1/4 inches wide by 0.050 inch thick by 36 inches long.

2.8 MISCELLANEOUS MATERIALS

- A. Sill-Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to suit width of sill members indicated.
- B. Adhesives for Gluing Furring and Sleepers to Concrete or Masonry: Formulation complying with ASTM D 3498 that is approved for use indicated by adhesive manufacturer.
  - 1. Use adhesives that have a VOC content of 70 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- C. Water-Repellent Preservative: NWWDA-tested and -accepted formulation containing 3-iodo-2-propynyl butyl carbamate, combined with an insecticide containing chloropyrifos as its active ingredient.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit. Locate furring, nailers, blocking, and similar supports to comply with requirements for attaching other construction.
- B. Framing Standard: Comply with AF&PA's "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- C. Metal Framing Anchors: Install metal framing to comply with manufacturer's written instructions.
- D. Do not splice members between supports, unless otherwise indicated.
- E. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
  - 1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches o.c
  - 2. Coordinate installation of Concealed Backing, Flooring, Grounds and Cants with other work.
- F. Provide fire blocking in furred spaces, stud spaces, and other concealed cavities as indicated and as follows:

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1. Fire block furred spaces of walls, at each floor level, at ceiling, and at not more than 96 inches o.c. with solid wood blocking or noncombustible materials accurately fitted to close furred spaces.
  2. Fire block concealed spaces of wood-framed walls and partitions at each floor level, at ceiling line of top story, and at not more than 96 inches o.c. Where fire blocking is not inherent in framing system used, provide closely fitted solid wood blocks of same width as framing members and 2-inch nominal- thickness.
  3. Fire block concealed spaces between floor sleepers with same material as sleepers to limit concealed spaces to not more than 100 sq. ft. (9.3 sq. m) and to solidly fill space below partitions.
- G. Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- H. Comply with AWP A M4 for applying field treatment to cut surfaces of preservative-treated lumber.
1. Use inorganic boron for items that are continuously protected from liquid water.
  2. Use copper naphthenate for items not continuously protected from liquid water.
- I. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
1. NES NER-272 for power-driven fasteners.
  2. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
- J. Use common wire nails, unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood; do not countersink nail heads, unless otherwise indicated.
- K. For exposed work, arrange fasteners in straight rows parallel with edges of members, with fasteners evenly spaced, and with adjacent rows staggered.
1. Comply with approved fastener patterns where applicable.
  2. Use finishing nails, unless otherwise indicated. Countersink nail heads and fill holes with wood filler.
- 3.2 WOOD SLEEPER, BLOCKING, AND NAILER INSTALLATION
- A. Provide solid wood blocking, backing, furring, nailers and grounds in equipment bases, walls and ceiling for support of all wall and/or ceiling mounted equipment, fixtures, railings, grab bars, doorstops and miscellaneous surface mounted items.
- B. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.

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- C. Provide solid fire treated wood blocking or sheathing backing for all wall mounted equipment, chalkboards, tack boards, shelf standards, wall cabinets, mirrors, toilet accessories, partitions, panels shelving, casework, fixtures, door stops, etc.
- D. At existing framed wall and ceiling construction, install solid fire treated wood blocking for all equipment, chalkboards, tack boards, shelf standards, wall cabinets, mirrors, toilet accessories, partitions, panels shelving, casework, fixtures, door stops, etc. Remove existing finishes as necessary to install solid blocking and/or backing. Patch back finishes to match existing adjacent surfaces.
- E. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces, unless otherwise indicated.
- F. Provide permanent grounds of dressed, pressure-preservative-treated, key-beveled lumber not less than 1-1/2 inches wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

3.3 PROTECTION

- A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 061000

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SECTION 061600 - SHEATHING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Wall equipment support sheathing.
2. Miscellaneous framing sheathing.

1.2 SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements.

PART 2 - PRODUCTS

2.1 WOOD PANEL PRODUCTS

- A. Emissions: Products shall meet the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- B. Plywood: DOC PS 1.
- C. Oriented Strand Board: DOC PS 2.

2.2 WALL SHEATHING

- A. Plywood Wall Sheathing: Exterior, Structural I sheathing.

2.3 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.

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**PART 3 - EXECUTION**

**3.1 INSTALLATION, GENERAL**

- A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.
- B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.
- C. Securely attach to substrate by fastening as indicated, complying with the following:
  - 1. NES NER-272 for power-driven fasteners.
  - 2. Table 2304.9.1, "Fastening Schedule," in ICC's "International Building Code."
  - 3. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's "International Residential Code for One- and Two-Family Dwellings."
- D. Coordinate wall and roof sheathing 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. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

**3.2 WOOD STRUCTURAL PANEL INSTALLATION**

- A. General: Comply with applicable recommendations in APA Form No. E30, "Engineered Wood Construction Guide," for types of structural-use panels and applications indicated.
- B. Fastening Methods: Fasten panels as indicated below:
  - 1. Wall and Roof Sheathing:
    - a. Nail to wood framing
    - b. Screw to cold-formed metal framing.
    - c. Space panels 1/8 inch apart at edges and ends.

END OF SECTION 061600

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SECTION 062000 - INTERIOR FINISH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
1. Providing finish carpentry items, other than custom casework
  2. Items include, but are not limited to trim at locations requiring closure due to existing wall and ceiling conditions.
  3. Hardware and attachment accessories

1.2 DEFINITIONS

- A. Lumber grading agencies, and the abbreviations used to reference them, include the following:
1. NeLMA: Northeastern Lumber Manufacturers' Association.
  2. NHLA: National Hardwood Lumber Association.
  3. NLGA: National Lumber Grades Authority.
  4. WCLIB: West Coast Lumber Inspection Bureau.
  5. WWPA: Western Wood Products Association.
- B. MDF: Medium-density fiberboard.
- C. MDO Plywood: Plywood with a medium-density overlay on the face.

1.3 SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials, dimensions, profiles, textures, and colors and include construction and application details.
1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained. Include chemical treatment manufacturer's written instructions for finishing treated material.
  2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements.
  3. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
  4. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

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1.4 DELIVERY, STORAGE, AND HANDLING

- A. Protect materials against weather and contact with damp or wet surfaces. Stack lumber, plywood, and other panels flat with spacers between each bundle to provide air circulation. Provide for air circulation within and around stacks and under temporary coverings.
- B. Deliver interior finish carpentry materials only when environmental conditions meet requirements specified for installation areas. If interior finish carpentry materials must be stored in other than installation areas, store only where environmental conditions meet requirements specified for installation areas.

1.5 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install interior finish carpentry materials until building is enclosed and weatherproof, wet work in space is completed and nominally dry, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.
- B. Do not install finish carpentry materials that are wet, moisture damaged, or mold damaged.
  - 1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
  - 2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.
- C. Quality Standard: Unless otherwise indicated, comply with AWI's "Architectural Woodwork Quality Standards" for grades of interior architectural woodwork indicated for construction, finishes, installation, and other requirements.
  - 1. Perform work in accordance with AWI Custom Grade standards, as a minimum requirement
  - 2. The Contract Documents contain selections chosen from options in the quality standard and additional requirements beyond those of the quality standard. Comply with such selections and requirements in addition to the quality standard.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Lumber: DOC PS 20 and applicable grading rules of inspection agencies certified by ALSC's Board of Review.
  - 1. Factory mark each piece of lumber with grade stamp of inspection agency indicating grade, species, moisture content at time of surfacing, and mill.
  - 2. For exposed lumber, mark grade stamp on end or back of each piece

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- B. MDF: ANSI A208.2, Grade 130 made with binder containing no urea-formaldehyde resin.
- C. Finishes: Reference Finish Schedule, Finish Material Designations

2.2 STANDING AND RUNNING TRIM

- A. AWI Grade: Custom
- B. Lumber Trim for Opaque Finish (Painted):
  - 1. Species and Grade: Alder, aspen, basswood, cottonwood, gum, magnolia, soft maple, sycamore, tupelo, or yellow poplar; A finish; NHLA.
  - 2. Maximum Moisture Content: 15 percent.
  - 3. Finger Jointing: Allowed.
  - 4. Face Surface: Surfaced (smooth).
  - 5. Optional Material: Primed MDF of same actual dimensions as lumber indicated may be used in lieu of lumber.

2.3 MISCELLANEOUS MATERIALS

- A. Fasteners for Interior Finish Carpentry: Nails, screws, and other anchoring devices of type, size, material, and finish required for application indicated to provide secure attachment, concealed where possible.
  - 1. Where galvanized finish is indicated, provide fasteners and anchorages with hot-dip galvanized coating complying with ASTM A 153/A 153M.
- B. Glue: Aliphatic-resin, polyurethane, or resorcinol wood glue recommended by manufacturer for general carpentry use.
  - 1. Use wood glue that has a VOC content of 30 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- C. Paneling Adhesive: Comply with paneling manufacturer's written recommendations for adhesives.
  - 1. Use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- D. Multipurpose Construction Adhesive: Formulation complying with ASTM D 3498 that is recommended for indicated use by adhesive manufacturer.
  - 1. Use adhesive that has a VOC content of 70 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.4 FABRICATION

- A. Back out or kerf backs of Interior standing and running trim except shoe and crown molds except those with ends exposed in finished work:



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- B. Ease edges of lumber less than 1 inch in nominal thickness to 1/16-inch radius and edges of lumber 1 inch or more in nominal thickness to 1/8-inch radius

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

- A. Examine substrates, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Examine finish carpentry materials before installation. Reject materials that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

**3.2 PREPARATION**

- A. Clean substrates of projections and substances detrimental to application.
- B. Before installing interior finish carpentry, condition materials to average prevailing humidity in installation areas for a minimum of 48 hours unless longer conditioning is recommended by manufacturer.

**3.3 INSTALLATION, GENERAL**

- A. Grade: Install woodwork to comply with requirements for the same grade specified in Part 2 for fabrication of type of woodwork involved.
- B. Assemble woodwork and complete fabrication at Project site to comply with requirements for fabrication in Part 2, to extent that it was not completed in the shop.
- C. Do not use materials that are unsound, warped, improperly treated or finished, inadequately seasoned, or too small to fabricate with proper jointing arrangements.
  - 1. Do not use manufactured units with defective surfaces, sizes, or patterns.
- D. Install interior finish carpentry level, plumb, true, and aligned with adjacent materials. Use concealed shims where necessary for alignment.
  - 1. Scribe and cut interior finish carpentry to fit adjoining work. Refinish and seal cuts as recommended by manufacturer. Carefully scribe cabinetwork which is against other building materials, leaving gaps of 1/32 inch maximum. Do not use additional overlay trim for this purpose
  - 2. When necessary to cut and fit on site, make material with ample allowance for cutting. Provide trim for scribing and site cutting.
  - 3. Countersink fasteners, fill surface flush, and sand where face fastening is unavoidable.

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4. Install woodwork level, plumb, true, and straight. Shim as required with concealed shims. Install to tolerance of 1/8 inch in 96 inches for level and plumb. Install adjoining interior finish carpentry with 1/32-inch maximum offset for flush installation and 1/16-inch maximum offset for reveal installation.
5. Scribe and cut woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts (not applicable to casework).
6. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing as required for complete installation. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with woodwork and matching final finish if transparent finish is indicated (not applicable to casework).
7. Coordinate interior finish carpentry with materials and systems in or adjacent to it. Provide cutouts for mechanical and electrical items that penetrate interior finish carpentry.
8. Paneling: Anchor paneling to supporting substrate with concealed panel-hanger clips. Do not use face fastening, unless covered by trim.
  - a. Install flush paneling with no more than 1/16" in 96" vertical cup or bow and 1/8" in 96" horizontal variation from a true plane.

3.4 ADJUSTING

- A. Replace interior finish carpentry that is damaged or does not comply with requirements. Interior finish carpentry may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing. Adjust joinery for uniform appearance.

3.5 CLEANING

- A. Clean interior finish carpentry on exposed and semi-exposed surfaces. Touch up factory-applied finishes to restore damaged or soiled areas.

3.6 PROTECTION

- A. Protect installed products from damage from weather and other causes during remainder of the construction period.
- B. Remove and replace finish carpentry materials that are wet, moisture damaged, and mold damaged.
  1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
  2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 062000

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SECTION 072116 - BLANKET INSULATION

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes:

1. Blanket insulation in exterior wall, floor, ceiling, and roof assemblies. Scope of this work item is limited to batt insulation in attic.
2. Acoustical/Sound attenuation batt insulation in interior walls where shown on Drawings.
- 3.

B. Performance Requirements:

1. Materials of this Section shall provide continuity of thermal barrier at building enclosure elements in conjunction with thermal insulating materials in this Section.
2. Materials of this Section shall provide continuity of vapor and air barrier at building enclosure elements in conjunction with vapor retarders and air barriers.

1.2 REFERENCES

A. Comply with all References in effect, most active, or latest version as of the date of the Contract Documents.

B. ASTM International – American Society for Testing and Materials. (ASTM) ([www.astm.org](http://www.astm.org)):

1. C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded Hot-Plate Apparatus.
2. C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation
3. C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
4. C1029 - Standard Specification for Spray-Applied Rigid Cellular Polyurethane Thermal Insulation.
5. C1289- Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board
6. D1621 - Standard Test Method for Compressive Properties of Rigid Cellular Plastics.
7. D1622 - Standard Test Method for Apparent Density of Rigid Cellular Plastics.
8. D2842 Standard Test Method for Water Absorption of Rigid Cellular Plastics
9. E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
10. E96 - Standard Test Methods for Water Vapor Transmission of Materials.
11. E136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 Degrees C.

C. Current edition - International Building Code.

1.3 SUBMITTALS

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- A. Submit under provisions of Division 01.
- B. Product Data: Provide data on product characteristics, performance criteria, and limitations.
- C. Manufacturer's Installation Instructions: Indicate special procedures, perimeter conditions requiring special attention.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- E. Quality Control Submittals:
  - 1. Certificates of Compliance: Certification from an independent testing laboratory that insulation meets fire hazard classification requirements.
- F. Sustainable Design Criteria: Product Data for building insulation to be Greenguard certified or specified as no added urea formaldehyde resins used during manufacturing.

1.4 QUALITY ASSURANCE

- A. Qualifications:
  - 1. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years' experience.
  - 2. Applicator: Company specializing in performing the work of this section with minimum three (3) years' experience, approved/certified by Manufacturer.
- B. Fire Hazard Classification:
  - 1. Noncombustible, tested to ASTM E136.
  - 2. Flame spread/smoke developed rating of 25/50 or less, tested to ASTM E84.
- C. Pre-Installation Conference
  - 1. Convene one week prior to commencing work of this section, under provisions of Division 01.

1.5 PROJECT/SITE CONDITIONS

- A. Store insulation in clean, dry, sheltered area, off ground or floor, until used. Protect against wetting and moisture absorption

1.6 SEQUENCING AND SCHEDULING

- A. Coordinate Work under provisions of Division 01.
- B. Sequence work to ensure timely placement of insulation within construction spaces.

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**PART 2 – PRODUCTS**

**2.1 MANUFACTURERS**

**A. Batt and Blanket Insulation:**

1. Knauf Insulation. ([www.knaufinsulation.us](http://www.knaufinsulation.us))  
Product: Faced and un-faced fiberglass batt and blanket insulation.
2. Owens-Corning. ([www.owenscorning.com](http://www.owenscorning.com))
3. Substitutions: Under provisions of Division 01.

**B. Sound Insulation:**

1. Knauf Insulation. ([www.knaufinsulation.us](http://www.knaufinsulation.us))  
Product: Un-faced fiberglass batt sound attenuation insulation.
2. Owens-Corning. ([www.owenscorning.com](http://www.owenscorning.com))
3. Substitutions: Under provisions of Division 01.

**2.2 MATERIALS**

**A. Exterior Stud Walls: Un-faced pre-formed glass mineral fiber batt, friction fit (where interior vapor barrier and wall finish is indicated).**

1. Thermal Insulation
  - a. Thermal resistance: R of 13 (4 inch nominal walls), R of 21 (6 inch nominal walls) and R of 25 (8 inch nominal walls).
  - b. Batt width: Match framing spacing for friction fit.

**B. Miscellaneous wall infill framing (above finish): Faced pre-formed glass mineral fiber batt.**

1. Thermal Insulation
  - a. Thermal Resistance: R of 21 (6 inch nominal walls)
  - b. Batt width: Match framing spacing and provide extra wide stapling flanges as required for installation shown.
  - c. Facing FSK (Foil-Scrim-Kraft) vapor retarder facing.

**C. Interior stud walls: Un-faced pre-formed glass mineral fiber sound attenuation batt insulation, friction fit.**

1. Acoustic insulation, ASTM C665 Type I, ASTM E136
  - a. Minimum of 10 STC improvement.
  - b. Thickness as required to fill nominal stud cavity (3.5 or 5.5 inch)
  - c. Batt width (5-1/4 inch, 22 inch as required for friction fit).

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2.3 ACCESSORIES AND MATERIALS

- A. Include insulation baffles where required for continuous ventilation. Include dimensional lumber furring strips as staple flanges to span truss webs where insulation is indicated at margin below top chord of trusses.
- B. Tape: Minimum 4 inches wide, pressure sensitive, foil faced, waterproof.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Verify site conditions under provisions of Division 01.
- B. Verify that substrate, adjacent materials, and insulation boards are dry and ready to receive insulation.
- C. Verify substrate surface is flat, free of honeycomb, fins, irregularities, materials or substances that may impede installation.

3.2 PREPARATION

- A. Clean substrates of substances harmful to insulation or vapor retarders, including removing projections capable of puncturing vapor retarders or of interfering with insulation attachment.

3.3 INSTALLATION

- A. Install in accordance with NAIMA “Recommendations for Installation in Residential and Other Light-Frame Construction – Fiber Glass Building Insulation” and manufacturer’s instructions.
- B. Between Studs, Rafters, and Joists:
  - 1. Un-faced Insulation: Friction fit insulation between framing members after cover material has been installed on one side of cavity. In applications without a cover material, use wire or metal straps to hold insulation in place.
  - 2. Faced Insulation: Staple attachment flanges to face or side of framing member every 8 to 12 inches (200 to 305 mm) on verticals, every 6 to 8 inches (150 to 200 mm) on horizontals and slopes.
  - 3. Faced Insulation: Friction fit insulation between framing members after cover material has been installed on one side of cavity. In applications without a cover material, use wire or metal straps to hold insulation in place.
- C. Over Existing and new Ceilings:
  - 1. Install insulation with face contacting back of ceiling; butt insulation tightly together at edges to prevent thermal leaks. Install at existing ceilings, only in locations where existing conditions are disturbed by the work of this project.

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- D. Maintain vapor retarder integrity by tightly abutting adjacent insulation.
- E. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed at any time to ice, rain, and snow.
- F. Extend insulation in thickness indicated to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- G. Water-Piping Coordination: If water piping is located within insulated exterior walls, coordinate location of piping to ensure that it is placed on warm side of insulation and insulation encapsulates piping.
- H. Install 3-inch- thick or 5-inch thick, un-faced sound attenuation blanket insulation in walls indicated and over suspended ceilings at partitions in a width that extends insulation 48 inches on either side of partition.
- I. Stuff glass-fiber loose-fill insulation into miscellaneous voids and cavity spaces where shown. Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft.
- J. Insulation Tape:
  - 1. Repair punctures or tears in vapor retarder facing by taping.
  - 2. Follow tape Manufacture's application recommendations.
  - 3. Apply with vapor barrier facing towards interior of structure.
  - 4. Tape seal lapped flanges, butt ends, and tears and holes in facings.

3.4 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of Division 01.

3.5 PROTECTION

- A. Protect finished Work under provisions of Division 01.
- B. Do not permit Work to be damaged prior to covering insulation.

END OF SECTION 072116

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SECTION 072129 - SPRAYED INSULATION

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes:

1. Fiber Insulation Spray applied to achieve a thermal and air seal.
2. Spray polyurethane foam insulation at all interior sound rated wall voids and crevices including but not limited to: walls, door frames, relite frames, and roof/ceiling deck.  
Note: filling voids shall occur at any wall shown to include acoustical insulation in the wall type.

B. Performance Requirements:

1. Materials of this Section shall provide continuity of thermal barrier at building enclosure elements in conjunction with thermal insulating materials in this Section.
2. Materials of this Section shall provide continuity of vapor and air barrier at building enclosure elements in conjunction with vapor retarders and air barriers.

1.2 REFERENCES

A. ASTM International (ASTM):

1. C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus.
2. C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
3. C1029 - Standard Specification for Spray-Applied Rigid Cellular Polyurethane Thermal Insulation.
4. C1338 - Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facing.
5. D1621 - Standard Test Method of Compressive Properties of Rigid Cellular Plastics.
6. D1622 - Standard Test Method for Apparent Density of Rigid Cellular Plastics.
7. D2126 - Standard Test Method for Response for Rigid Cellular Plastics to Thermal and Humid Aging.
8. D2842 - Standard Test Method for Water Absorption of Rigid Cellular Plastics
9. D5116 - Standard Guide for Small-Scale Environmental Chamber Determinations of Organic Emissions from Indoor Materials/Products.
10. E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
11. E96 - Standard Test Methods for Water Vapor Transmission of Materials
12. E283 - Standard Test Method for Determining Rate of Air Leakage through Exterior Windows, Curtain Walls, and Doors under Specified Pressure Differences across the Specimen.



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13. E1623 - Standard Test Method for Determination of Fire and Thermal Parameters of Materials, Products, and Systems Using and Intermediate Scale Calorimeter (ICAL)

B. Current International Building Code.

1.3 SUBMITTALS

A. Submit under provisions of Division 01.

B. Product Data: Provide data on product characteristics, performance criteria, and limitations.

C. Manufacturer's Installation Instructions: Indicate special procedures, perimeter conditions requiring special attention.

D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

E. Quality Control Submittals

1. Certificates of Compliance: Certification from an independent testing laboratory that insulation meets fire hazard classification requirements.

F. Sustainable Design Criteria: Product Data for building insulation to be Greengard certified or specified as no added urea formaldehyde resins used during manufacturing.

1.4 QUALITY ASSURANCE

A. Applicator Qualifications: Minimum five (5) years documented experience in work of this Section.

B. Fire Hazard Classification: Maximum flame spread/smoke developed rating of 25/450, tested to ASTM E84.

C. Qualifications

1. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years' experience.

2. Applicator: Company specializing in performing the work of this section with minimum three years' experience, approved/certified by manufacturer.

1.5 PROJECT CONDITIONS

A. Do not apply insulation when air or surface temperature is less than 50 degrees F, nor when such temperatures are anticipated within 24 hours after application.

B. Consult Manufacturer for application procedures during excessively humid or other adverse weather conditions.

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- C. Do not install insulation adhesives when temperature or weather conditions are detrimental to successful installation.

1.6 SEQUENCING AND SCHEDULING

- A. Coordinate the Work with Division 07 for installation of weather barrier and vapor retarders.
- B. Do not position ducts, piping, conduit, and other suspended equipment that will interfere with uniform application until after application.
- C. Place conduit, boxes, wiring, plumbing lines, and other components prior to application of insulation where these can be anticipated in advance.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. CertainTeed Corp. ([www.certainteed.com](http://www.certainteed.com))
  - 1. Product: Closed Cell Certa-Spray Foam
- B. BASF Corporation ([www.basf.com](http://www.basf.com))
  - 1. Product: Spraytight
- C. BaySystems North America, LLC. ([www.baysystems-northamerica.com](http://www.baysystems-northamerica.com))
  - 1. Product: Ecobay
- D. Dow Chemical Company ([www.dow.com](http://www.dow.com))
  - 1. Product: Froth-Pak
- E. Icynene ([www.icynene.com](http://www.icynene.com))
  - 1. Product MD-C-200
- F. Accella Polyurethane Systems
  - 1. Product: equal to basis of design.
- G. Substitutions: Under provisions of Division 01.

2.2 MATERIALS

- A. Closed Cell Polyurethane Foam Insulation:
  - 1. ASTM C1029, Type II, with maximum flame-spread and smoke-developed indexes of 25 and 460, respectively, per ASTM E84.

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2. Thermal Performance (aged): Tested in accordance with ASTM C518 and/or ASTM C177 at 75 degrees F mean temperature.
  - a. Thickness 1 inch, R-Value 5.8 (h-ft<sup>2</sup>-degreesF)/Btu.
  - b. Thickness 6 inches, R-Value 38.4 (h-ft<sup>2</sup>-degreesF)/Btu.
3. Apply to a thickness to achieve a minimum R rating of 38. (Approximately 6 inches thick).
4. Physical and Mechanical Properties:
  - a. Core Density: 1.9-2.4 pcf when tested in accordance with ASTM D1622.
  - b. Thermal Resistance (Initial): 6.4 when tested in accordance with ASTM C518 at 75 degrees F, (h-ft<sup>2</sup> – degrees F)/Btu.
  - c. Closed Cell Content: 88-95 percent when tested in accordance with ASTM D2842.
  - d. Compressive Strength: Greater than 25 psi when tested in accordance with ASTM D1621.
  - e. Tensile Strength: 23 psi when tested in accordance with ASTM E1623.
  - f. Water Absorption: Less than 2 percent by volume when tested in accordance with ASTM D2842.
  - g. Dimensional Stability: Less than 9 percent by volume when tested in accordance with ASTM D2126 at 75 degrees F/95 percent RH, 28 Day.
  - h. Water Vapor Transmission: 1.3 perm/inch when tested in accordance with ASTM E96.
  - i. Air Permeability: 0.013 when tested in accordance with ASTM E283 at 1 inch thickness, L/s/m<sup>2</sup>.
  - j. Fungi Resistance: Pass, with no growth when tested in accordance with ASTM C1338.
5. Fire performance:
  - a. Flame Spread: Less than 25 when tested in accordance with ASTM E84.
  - b. Smoke: Less than 450 when tested in accordance with ASTM E84.
6. Fire performance:
  - a. Flame Spread: Less than 25 when tested in accordance with ASTM E84.
  - b. Smoke: Less than 450 when tested in accordance with ASTM E84.
7. Products used within the building shell shall comply with the VOC limit requirements stated in section 01 81 14.

### 2.3 ACCESSORIES, MATERIALS AND FASTENERS

- A. Adhesive and anchoring attachment method as recommended by Manufacturer. Provide all materials required for complete and proper installation of insulation.

## PART 3 – EXECUTION

### 3.1 EXAMINATION

- A. Verify site conditions under provisions of Division 01.
- B. Verify that substrate, adjacent materials, and insulation boards are dry and ready to receive insulation.
- C. Verify substrate surface is flat, free of honeycomb, fins, irregularities, materials or substances that may impede installation.

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3.2 PREPARATION

- A. Clean surfaces to remove oil, grease, dirt, and other materials that could impair bond.
- B. Test painted steel surfaces to verify that paint will not impair bond.
- C. Protect adjacent surfaces from accidental application.
- D. Coordinate foam-in-place injection holes with masonry bond beams.

3.3 APPLICATION

- A. Install in strict accordance with Manufacturer's published instructions.
- B. Product must be installed according to local code, and must be applied by a qualified applicator.
- C. Apply insulation by spray method, to uniform monolithic density without voids.
- D. Seal plumbing stacks, electrical wiring and other penetrations into attic to control air leakage.
- E. Do not install spray foam insulation in areas where it will be in contact with equipment or materials with operating temperatures of 180 degrees F or greater.
- F. Apply insulation in unvented roof spaces and cathedral ceiling areas.
- G. Fill all perimeter building envelope voids for air tightness standards of the Energy Star Program. In-fill all voids with spray insulation for complete thermal and air seal.
- H. Inspection will include verification of insulation and density.

3.4 ADJUSTING

- A. Inspect areas for complete coverage; correct unacceptable work and patch.
- B. Patch damaged and cut areas.
- C. Replace areas where excessive shrinkage or cracking is evident.

3.5 PROTECTION

- A. Protect finished Work.
- B. Do not permit Work to be damaged prior to covering insulation.

END OF SECTION 072129

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SECTION 079200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes joint sealants for the following applications, including preparing sealant substrate surfaces, sealant and expandable backing. This work includes those installations specified by reference to this Section:
1. Exterior joints in the following vertical surfaces and horizontal non-traffic surfaces:
    - a. Construction joints in cast-in-place concrete.
    - b. Perimeter joints between differing materials and frames of doors windows and louvers
    - c. Other joints as indicated.
  2. Exterior joints in the following horizontal traffic surfaces:
    - a. Isolation and contraction joints in cast-in-place concrete slabs.
    - b. Other joints as indicated.
  3. Interior joints in the following vertical surfaces and horizontal non-traffic surfaces:
    - a. Tile control and expansion joints.
    - b. Perimeter joints between interior wall surfaces and frames of interior doors.
    - c. Joints between plumbing fixtures and adjoining walls, floors, and counters.
    - d. Other joints as indicated.
  4. Interior joints in the following horizontal traffic surfaces:
    - a. Isolation joints in cast-in-place concrete slabs.

1.2 PERFORMANCE REQUIREMENTS

- A. Provide elastomeric joint sealants that establish and maintain watertight and airtight continuous joint seals without staining or deteriorating joint substrates.
- B. Provide joint sealants for interior applications that establish and maintain airtight and water-resistant continuous joint seals without staining or deteriorating joint substrates.

1.3 SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.
- B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.
- C. Samples for Verification: For each type and color of joint sealant required, provide Samples with joint sealants in 1/2-inch- wide joints formed between two 6-inch- long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

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- D. Product Certificates: For each type of joint sealant and accessory, signed by product manufacturer.
- E. SWRI Validation Certificate: For each elastomeric sealant specified to be validated by SWRI's Sealant Validation Program.
- F. Qualification Data: For Installer.
- G. Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating the following:
  - 1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
  - 2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.
- H. Field Test Report Log: For each elastomeric sealant application.
- I. Product Test Reports: Based on comprehensive testing of product formulations performed by a qualified testing agency, indicating that sealants comply with requirements.
- J. Warranties: Special warranties specified in this Section.
- K. Sustainable Design Criteria: For sealants and sealant primers used inside the weatherproofing system, including printed statement of VOC content.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.
- B. Preconstruction Compatibility and Adhesion Testing: Submit to joint-sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.
  - 1. Use manufacturer's standard test method to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
  - 2. Submit not fewer than eight pieces of each type of material, including joint substrates, shims, joint-sealant backings, secondary seals, and miscellaneous materials.
  - 3. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
  - 4. For materials failing tests, obtain joint-sealant manufacturer's written instructions for corrective measures including use of specially formulated primers.
  - 5. Testing will not be required if joint-sealant manufacturers submit joint preparation data that are based on previous testing of current sealant products for adhesion to, and compatibility with, joint substrates and other materials matching those submitted.
- C. Product Testing: Obtain test results for "Product Test Reports" Paragraph in "Submittals" Article from a qualified testing agency based on testing current sealant formulations within a 36-month period preceding the commencement of the Work.

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1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated, as documented according to ASTM E 548.
  2. Test other joint sealants for compliance with requirements indicated by referencing standard specifications and test methods.
- D. Preconstruction Field-Adhesion Testing: Before installing elastomeric sealants, field test their adhesion to Project joint substrates as follows:
1. Locate test joints where indicated on Project or, if not indicated, as directed by Architect.
  2. Conduct field tests for each application indicated below:
    - a. Each type of elastomeric sealant and joint substrate indicated.
    - b. Each type of non-elastomeric sealant and joint substrate indicated.
  3. Notify Architect seven days in advance of dates and times when test joints will be erected.
    - a. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193.
      - 1) For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
  4. Report whether sealant in joint connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each type of product and joint substrate. For sealants that fail adhesively, retest until satisfactory adhesion is obtained.
  5. Evaluation of Preconstruction Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing, in absence of other indications of noncompliance with requirements, will be considered satisfactory. Do not use sealants that fail to adhere to joint substrates during testing.

1.5 PROJECT CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer [or are below 40 degrees F]
  2. When joint substrates are wet.
  3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
  4. Contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.6 WARRANTY

- A. Special Installer's Warranty: Installer's standard form in which Installer agrees to repair or replace elastomeric joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
1. Warranty Period: Five years from date of Substantial Completion.

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- B. Special Manufacturer's Warranty: Manufacturer's standard form in which elastomeric sealant manufacturer agrees to furnish elastomeric joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.
  - 1. Warranty Period: 5 years from date of Substantial Completion.
- C. Special warranties specified in this Article exclude deterioration or failure of elastomeric joint sealants from the following:
  - 1. Movement of the structure resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression caused by structural settlement or errors attributable to design or construction.
  - 2. Disintegration of joint substrates from natural causes exceeding design specifications.
  - 3. Mechanical damage caused by individuals, tools, or other outside agents.
  - 4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

**PART 2 - PRODUCTS**

**2.1 MANUFACTURERS**

- A. Products: Subject to compliance with requirements, provide one of the products listed in other Part 2 articles.

**2.2 MATERIALS, GENERAL**

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer, based on testing and field experience.
- B. VOC Content of Interior Sealants: Provide sealants and sealant primers for use inside the weatherproofing system that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
  - 1. Acoustical Sealant: 250 g/L
  - 2. Architectural Sealants: 250 g/L.
  - 3. Non-membrane Roof Sealants: 300 g/L.
  - 4. Single-Ply Roof Membrane Sealants: 450 g/L.
  - 5. Sealant Primers for Nonporous Substrates: 250 g/L.
  - 6. Sealant Primers for Porous Substrates: 775 g/L.
  - 7. Modified Bituminous Sealant Primers: 500 g/L.
- C. Colors of Exposed Joint Sealants: Integrally colored sealants, as selected by Architect to match adjacent materials.



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2.3 ELASTOMERIC JOINT SEALANTS

- A. Elastomeric Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.
- B. Stain-Test-Response Characteristics: Where elastomeric sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.
- C. Suitability for Immersion in Liquids. Where elastomeric sealants are indicated for Use I for joints that will be continuously immersed in liquids, provide products that have undergone testing according to ASTM C 1247 and qualify for the length of exposure indicated by reference to ASTM C 920 for Class 1 or 2. Liquid used for testing sealants is deionized water, unless otherwise indicated.
- D. Suitability for Contact with Food: Where elastomeric sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600. Provide products and installations that comply with this requirement in Food Preparation and Food Serving Areas of the project.
- E. **Sealant Type #1: Single-Component Silicone Sealant:**
  - 1. Available Products:
    - a. Basis of Design: Dow Corning Corporation; 795
    - b. GE Silicones; SilPruf NB SCS9000.
    - c. GE Silicones; UltraPruf II SCS2900.
    - d. Pecora Corporation; 865.
    - e. Pecora Corporation; 895.
    - f. Pecora Corporation; 898.
  - 2. Type and Grade: S (single component) and NS (non-sag).
  - 3. Class: 50.
  - 4. Use Related to Exposure: NT (non-traffic).
  - 5. Uses Related to Joint Substrates: Coated glass, anodic aluminum, aluminum coated with a high-performance coating, galvanized steel.
  - 6. Stain-Test-Response Characteristics: Non-staining to porous substrates per ASTM C 1248.
- F. **Sealant Type #2: Single-Component Mildew-Resistant Acid-Curing Silicone Sealant:**
  - 1. Available Products:
    - a. Basis of Design: Dow Corning Corporation; 786 Mildew Resistant.
    - b. GE Silicones; Sanitary SCS1700.
    - c. Tremco; Tremsil 200 White Clear.
  - 2. Type and Grade: S (single component) and NS (non-sag).
  - 3. Class: 25.
  - 4. Use Related to Exposure: NT (non-traffic).
  - 5. Uses Related to Joint Substrates: Coated glass, anodic aluminum, aluminum coated with a high-performance coating, galvanized steel, ceramic tile.

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**G. Sealant Type #3: Multicomponent Non-sag Urethane Sealant:**

1. Available Products:
  - a. Basis of Design: Sonneborn, Division of ChemRex Inc.; NP 2.
  - b. Schnee-Morehead, Inc.; Permathane SM 7200.
  - c. Sika Corporation, Inc.; Sikaflex - 2c NS TG.
  - d. Tremco; Vulkem 227.
2. Type and Grade: M (multicomponent) and NS (nonsag).
3. Class: 25.
4. Uses Related to Exposure: T (traffic) and NT (nontraffic).

**H. Sealant Type #4: Single-Component Self Leveling Urethane Sealant:**

1. Available Products:
  - a. Basis of Design: ChemRex Sonneborn SL-1
  - b. Schnee-Morehead, Inc.; equivalent product to basis of design.
  - c. Sika Corporation, Inc.; equivalent product to basis of design.
  - d. Tremco; equivalent product to basis of design.
2. Type and Grade: S (single component) and SL (self leveling).
3. Class: 25.
4. Use Related to Exposure: T (traffic).

**I. Sealant Type #5: Single-Component Non-sag Urethane Sealant:**

1. Available Products:
  - a. Basis of Design: ChemRex Sonneborn NP-1
  - b. Bostik Findley; Chem-Calk 900.
  - c. Pecora Corporation; Dynatrol I-XL.
  - d. Polymeric Systems Inc.; Flexiprene 1000.
  - e. Polymeric Systems Inc.; PSI-901.
  - f. Schnee-Morehead, Inc.; Permathane SM7100.
  - g. Sika Corporation, Inc.; Sikaflex - 15LM.
  - h. Tremco; DyMonic.
2. Type and Grade: S (single component) and NS (non-sag).
3. Class: 25.
4. Use Related to Exposure: NT (non-traffic).

**2.4 LATEX JOINT SEALANTS**

**A. Sealant Type #6: Latex Sealant: Comply with ASTM C 834, Type P, Grade NF, for field applied paint finish.**

**B. Available Products:**

1. Bostik Findley; Chem-Calk 600.
2. Pecora Corporation; AC-20+.
3. Schnee-Morehead, Inc.; SM 8200.
4. Sonneborn, Division of ChemRex Inc.; Sonolac.
5. Tremco; Tremflex 834.

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2.5 ACOUSTICAL JOINT SEALANTS

- A. **Sealant Type #7:** Acoustical Sealant for Exposed and Concealed Joints: Manufacturer's standard non-sag, paintable, non-staining latex sealant complying with ASTM C 834 and the following:
1. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
  2. Available Products:
    - a. Pecora Corporation; AC-20 FTR Acoustical and Insulation Sealant.
    - b. United States Gypsum Co.; SHEETROCK Acoustical Sealant.
- B. Acoustical Sealant for Concealed Joints: Manufacturer's standard, nondrying, non-hardening, non-skinning, non-staining, gunnable, synthetic-rubber sealant recommended for sealing interior concealed joints to reduce airborne sound transmission.
1. Available Products:
    - a. Pecora Corporation; BA-98.
    - b. Tremco; Tremco Acoustical Sealant.

2.6 PREFORMED TAPE SEALANTS

- A. **Back-Bedding Mastic Tape Sealant:** Preformed, butyl-based elastomeric tape sealant with a solids content of 100 percent; non-staining and non-migrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape manufacturers for application indicated; packaged on rolls with a release paper backing; and complying with ASTM C 1281 and AAMA 800 for products indicated below:
1. AAMA 807.3 tape, for applications in which tape is not subject to continuous pressure.
- B. **Expanded Cellular Tape Sealant:** Closed-cell, PVC foam tape sealant; factory coated with adhesive on both surfaces; packaged on rolls with release liner protecting adhesive; and complying with AAMA 800 for the following types:
1. Type 1, for applications in which tape acts as the primary sealant.
  2. Type 2, for applications in which tape is used in combination with a full bead of liquid sealant.

2.7 JOINT-SEALANT BACKING

- A. **General:** Provide sealant backings of material and type that are non-staining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. **Cylindrical Sealant Backings:** ASTM C 1330, Type C (closed-cell material with a surface skin), and of size and density to control sealant depth and otherwise contribute to producing

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optimum sealant performance.

- C. Elastomeric Tubing Sealant Backings: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D 1056, nonabsorbent to water and gas, and capable of remaining resilient at temperatures down to minus 26 deg F. Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and to otherwise contribute to optimum sealant performance.
- D. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.8 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
- C. Masking Tape: Non-staining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
  - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.

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2. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
  - a. Concrete.
  - b. Masonry.
  - c. Unglazed surfaces of ceramic tile.
3. Remove laitance and form-release agents from concrete.
4. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
  - a. Metal.
  - b. Glass.
  - c. Porcelain enamel.
  - d. Glazed surfaces of ceramic tile.

B. Joint Priming: Prime joint substrates, where recommended in writing by joint-sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

1. Mask all locations where silicone based sealants are installed. No silicone based sealant shall be allowed to migrate onto adjacent finished surfaces.

### 3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Acoustical Sealant Application Standard: Comply with recommendations in ASTM C 919 for use of joint sealants in acoustical applications as applicable to materials, applications, and conditions indicated.
- D. Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
  1. Do not leave gaps between ends of sealant backings.
  2. Do not stretch, twist, puncture, or tear sealant backings.
  3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

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- E. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- F. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
  - 1. Place sealants so they directly contact and fully wet joint substrates.
  - 2. Completely fill recesses in each joint configuration.
  - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- G. Tooling of Non-sag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
  - 1. Remove excess sealant from surfaces adjacent to joints.
  - 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
  - 3. Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.
    - a. Use masking tape to protect surfaces adjacent to recessed tooled joints.
  - 4. Provide flush joint configuration where indicated per Figure 5B in ASTM C 1193.
- H. Installation of Preformed Tapes: Install according to manufacturer's written instructions.

3.4 FIELD QUALITY CONTROL

- A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:
  - 1. Extent of Testing: Test completed elastomeric sealant joints as follows:
    - a. Perform 10 tests for the first 1000 feet of joint length for each type of elastomeric sealant and joint substrate.
    - b. Perform 1 test for each 1000 feet of joint length thereafter or 1 test per each floor per elevation.
  - 2. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab in Appendix X1 in ASTM C 1193, as appropriate for type of joint-sealant application indicated.
    - a. For joints with dissimilar substrates, verify adhesion to each substrate separately; do this by extending cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
  - 3. Inspect joints for complete fill, for absence of voids, and for joint configuration complying with specified requirements. Record results in a field-adhesion-test log.
  - 4. Inspect tested joints and report on the following:
    - a. Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each type of product and joint substrate. Compare these results to determine if adhesion passes sealant manufacturer's field-adhesion hand-pull test criteria.
    - b. Whether sealants filled joint cavities and are free of voids.
    - c. Whether sealant dimensions and configurations comply with specified requirements.

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5. Record test results in a field-adhesion-test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant fill, sealant configuration, and sealant dimensions.
6. Repair sealants pulled from test area by applying new sealants following same procedures used originally to seal joints. Ensure that original sealant surfaces are clean and that new sealant contacts original sealant.

- B. Evaluation of Field Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.5 CLEANING

- A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.
- B. Remove any and all sealant material outside of the joint area. Fully remove the sealant material to allow for a complete and satisfactory installation of other finishes including paint.

3.6 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.7 JOINT-SEALANT SCHEDULE

- A. Joint-Sealant Application: Interior joints in High Moisture and Mildew Areas, between plumbing fixtures and adjoining walls, floors, and counters.
  1. Joint Sealant: Sealant Type #2.
  - ~~2.~~ Joint-Sealant Color: To match adjacent material color, as selected by Architect from manufacturer's full and complete range.
- B. Joint-Sealant Application: Exterior vertical and horizontal non-traffic construction joints in cast-in-place concrete.
  1. Joint Sealant: Sealant Type #3 or #5.
  2. Joint-Sealant Color: To match adjacent material color, as selected by Architect from manufacturer's full and complete range.
- C. Joint-Sealant Application: Exterior horizontal traffic isolation and contraction joints in cast-in-place concrete slabs.
  1. Joint Sealant: Sealant Type #4.

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- ~~2.~~ Joint-Sealant Color: To match adjacent material color, as selected by Architect from manufacturer's full and complete range.
  
- D. Joint-Sealant Application: Interior perimeter joints of exterior openings, perimeter joints between interior ceiling surfaces, interior wall surfaces, trim components, and frames of interior doors, and windows, interior and exterior sealant-pointed mortar joints in glass unit masonry assemblies.
  - 1. Joint Sealant: Sealant Type #6.
  - 2. Joint-Sealant Color: To match adjacent material color, as selected by Architect from manufacturer's full and complete range.
  
- E. Joint-Sealant Application: Acoustical perimeter joints between interior ceiling surfaces, interior wall surfaces and frames of interior doors, and windows. Install on all walls indicated to receive acoustical wall insulation (indicated by wall type reference in the drawings).
  - 1. Joint Sealant: Sealant Type #7.
  - 2. Joint-Sealant Color: To match adjacent material color, as selected by Architect from manufacturer's full and complete range.

END OF SECTION 079200



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SECTION 081113 - HOLLOW METAL DOORS & FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Standard hollow metal doors and frames.

1.2 DEFINITIONS

- A. Minimum Thickness: Minimum thickness of base metal without coatings.
- B. Standard Hollow Metal Work: Hollow metal work fabricated according to ANSI/SDI A250.8.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, core descriptions, fire-resistance rating, temperature-rise ratings, and finishes.
- B. Shop Drawings: Include the following:
  1. Elevations of each door design.
  2. Details of doors, including vertical and horizontal edge details and metal thicknesses.
  3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
  4. Locations of reinforcement and preparations for hardware.
- C. Samples for Verification:
  1. For each type of exposed finish required, prepared on Samples of not less than 3 by 5 inches.
  2. For the following items, prepared on Samples about 12 by 12 to demonstrate compliance with requirements for quality of materials and construction:
    - a. Doors: Show vertical-edge, top, and bottom construction; core construction; and hinge and other applied hardware reinforcement. Include separate section showing glazing if applicable.
    - b. Frames: Show profile, corner joint, floor and wall anchors, and silencers. Include separate section showing fixed hollow metal panels and glazing if applicable.
- D. Other Action Submittals:
  1. Schedule: Provide a schedule of hollow metal work prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with door hardware schedule.

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- E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each type of hollow metal door and frame assembly.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain hollow metal work from single source from single manufacturer.
- B. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.
  - 1. Temperature-Rise Limit: At vertical exit enclosures and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F above ambient after 30 minutes of standard fire-test exposure.
- C. Fire-Rated, Borrowed-Light Frame Assemblies: Assemblies complying with NFPA 80 that are listed and labeled, by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 257 or UL 9. Label each individual glazed lite.
- D. Smoke-Control Door Assemblies: Comply with NFPA 105 or UL 1784.
- E. Install doors in accordance with SDI-100 and building code standards for labeled doors.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver hollow metal work palletized, wrapped, or crated to provide protection during transit and Project-site storage. Do not use non-vented plastic.
  - 1. Provide additional protection to prevent damage to finish of factory-finished units.
- B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
- C. Store hollow metal work under cover at Project site. Place in stacks of five units maximum in a vertical position with heads up, spaced by blocking, on minimum 4-inch- high wood blocking. Do not store in a manner that traps excess humidity.
  - 1. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

1.6 PROJECT CONDITIONS

- A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

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1.7 COORDINATION

- A. Coordinate installation of anchorages for hollow metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Basis of Design: Ceco Door Products; an Assa Abloy Group company.; Product Imperial Series Doors, Maxim Series Doors, and CF Series Frames
  - 2. Amweld Building Products, LLC.
  - 3. Curries Company; an Assa Abloy Group company.
  - 4. Steelcraft; an Ingersoll-Rand company.
  - 5. Approved equal substitution in accordance with Division 01 procedures and requirements.

2.2 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
- B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.
- C. Frame Anchors: ASTM A 591/A 591M, Commercial Steel (CS), 40Z coating designation; mill phosphatized.
  - 1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.
- D. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.
- E. Powder-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow metal frames of type indicated.
- F. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool with 6- to 12-lb/cu. ft. density; with maximum flame-spread and smoke-development indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.

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- G. Glazing: Comply with requirements in Division 08 Section "Glazing."
- H. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.3 STANDARD HOLLOW METAL DOORS

- A. General: Provide doors of design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces unless otherwise indicated. Comply with ANSI/SDI A250.8.
  - 1. Design: Flush panel.
  - 2. Core Construction: Manufacturer's standard kraft-paper honeycomb, polystyrene, polyurethane, polyisocyanurate, mineral-board, or vertical steel-stiffener core.
    - a. Fire Door Core: As required to provide fire-protection and temperature-rise ratings indicated.
    - b. Thermal-Rated (Insulated) Doors: Where indicated, provide doors fabricated with thermal-resistance value (R-value) of not less than 6.0 deg F x h x sq. ft./Btu when tested according to ASTM C 1363.
      - 1) Locations: Exterior doors.
  - 3. Vertical Edges for Single-Acting Doors: Manufacturer's standard.
    - a. Beveled Edge: 1/8 inch in 2 inches.
  - 4. Vertical Edges for Double-Acting Doors: Round vertical edges with 2-1/8-inch radius.
  - 5. Top and Bottom Edges: Closed with flush or inverted 0.042-inch- thick, end closures or channels of same material as face sheets.
  - 6. Tolerances: Comply with SDI 117, "Manufacturing Tolerances for Standard Steel Doors and Frames."
- B. Interior Doors: Face sheets fabricated from cold-rolled steel sheet. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:
  - 1. Level 2 and Physical Performance Level B (Heavy Duty), Model 1 (Full Flush).
    - a. Width: 1-3/4 inches.
    - b. 18 gauge construction.
- C. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.
- D. Fabricate concealed stiffeners and hardware reinforcement from either cold- or hot-rolled steel sheet.

2.4 STANDARD HOLLOW METAL FRAMES

- A. General: Comply with ANSI/SDI A250.8 and with details indicated for type and profile.
- B. Interior Frames: Fabricated from cold-rolled steel sheet.

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1. Fabricate frames with mitered or coped corners.
  2. Fabricate frames as full profile welded unless otherwise indicated, or in existing conditions, provide knockdown type frames to work in existing masonry conditions.
  3. Frames for Level 2 Steel Doors: 16 gauge- thick steel sheet.
  4. Frames for Wood Doors: 16 gauge- thick steel sheet.
- C. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcement plates from same material as frames.
- D. See division 07 for insulated frames at all exterior walls and all interior sound walls.

**2.5 FRAME ANCHORS**

- A. Jamb Anchors:
1. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.
- B. Floor Anchors: Formed from same material as frames, not less than 0.042 inch (thick, and as follows:
1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.

**2.6 STOPS AND MOLDINGS**

- A. Fixed Frame Moldings: Formed integral with hollow metal frames, a minimum of 5/8 inch high unless otherwise indicated.

**2.7 FABRICATION**

- A. Fabricate hollow metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.
- B. Tolerances: Fabricate hollow metal work to tolerances indicated in SDI 117.
- C. Hollow Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
1. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
  2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
  3. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
  4. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.

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5. Jamb Anchors: Provide number and spacing of anchors as follows:
  - a. Masonry Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
    - 1) Two anchors per jamb up to 60 inches high.
    - 2) Three anchors per jamb from 60 to 90 inches high.
    - 3) Four anchors per jamb from 90 to 120 inches high.
  - b. Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
    - 1) Three anchors per jamb up to 60 inches high.
    - 2) Four anchors per jamb from 60 to 90 inches high.
    - 3) Five anchors per jamb from 90 to 96 inches high.
    - 4) Two anchors per head for frames above 42 inches wide and mounted in metal-stud partitions.
  - c. Compression Type: Not less than two anchors in each jamb.
  - d. Post-installed Expansion Type: Locate anchors not more than 6 inches from top and bottom of frame. Space anchors not more than 26 inches o.c.
6. Door Silencers: Except on weather-stripped doors, drill stops to receive door silencers as follows. Keep holes clear during construction.
  - a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
  - b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.

D. Fabricate concealed stiffeners, edge channels, and hardware reinforcement from either cold- or hot-rolled steel sheet.

E. Hardware Preparation: Factory prepare hollow metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to the Door Hardware Schedule and templates furnished as specified in Division 08 Section "Door Hardware."

1. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8.
2. Reinforce doors and frames to receive non-templated, mortised and surface-mounted door hardware.
3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.

## 2.8 STEEL FINISHES

A. Prime Finish: Apply manufacturer's standard primer immediately after cleaning and pretreating.

1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI/SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

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**PART 3 - EXECUTION**

**3.1 EXAMINATION**

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.
- C. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

**3.2 PREPARATION**

- A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.
- B. Prior to installation, adjust and securely brace welded hollow metal frames for squareness, alignment, twist, and plumbness to the following tolerances:
  - 1. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
  - 2. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
  - 3. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
  - 4. Plumbness: Plus or minus 1/16 inch measured at jambs on a perpendicular line from head to floor.
- C. Drill and tap doors and frames to receive non-templated, mortised, and surface-mounted door hardware.

**3.3 INSTALLATION**

- A. General: Install hollow metal work plumb, rigid, properly aligned, and securely fastened in place; comply with SDI 100, Drawings and manufacturer's written instructions.
- B. Hollow Metal Frames: Install hollow metal frames of size and profile indicated. Comply with ANSI/SDI A250.11.
  - 1. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.

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- a. At fire-protection-rated openings, install frames according to NFPA 80.
  - b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
  - c. Install frames with removable glazing stops located on secure side of opening.
  - d. Install door silencers in frames before grouting.
  - e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
  - f. Check plumbness, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
  - g. Field apply bituminous coating to backs of frames that are filled with grout containing anti-freezing agents.
2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with post-installed expansion anchors.
    - a. Floor anchors may be set with powder-actuated fasteners instead of post-installed expansion anchors if so indicated and approved on Shop Drawings.
  3. In-Place Concrete or Masonry Construction: Secure frames in place with post-installed expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
  4. In-Place Gypsum Board Partitions: Secure frames in place with post-installed expansion anchors through floor anchors at each jamb. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
  5. Ceiling Struts: Extend struts vertically from top of frame at each jamb to overhead structural supports or substrates above frame unless frame is anchored to masonry or to other structural support at each jamb. Bend top of struts to provide flush contact for securing to supporting construction. Provide adjustable wedged or bolted anchorage to frame jamb members.
  6. Installation Tolerances: Adjust hollow metal door frames for squareness, alignment, twist, and plumb to the following tolerances:
    - a. Squareness: Plus or minus 1/16 inch measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
    - b. Alignment: Plus or minus 1/16 inch measured at jambs on a horizontal line parallel to plane of wall.
    - c. Twist: Plus or minus 1/16 inch measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
    - d. Plumbness: Plus or minus 1/16 inch measured at jambs at floor.
- C. Hollow Metal Doors: Fit hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.
1. Non-Fire-Rated Standard Steel Doors:
    - a. Jambs and Head: 1/8 inch plus or minus 1/16 inch.
    - b. Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch.
    - c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.
    - d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch.

### 3.4 ADJUSTING AND CLEANING

- A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace



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defective work, including hollow metal work that is warped, bowed, or otherwise unacceptable.

- B. Remove grout and other bonding material from hollow metal work immediately after installation.
- C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

END OF SECTION 081113

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SECTION 083113 - ACCESS DOORS & FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. In project areas where required for access to utilities: Non-rated wall and ceiling access doors and frame units. Furnish in quantities and sizes required for access purposes to utilities requiring service and general concealed space/attic access. Coordinate sizes, quantities, and locations with architectural drawings, as well as equipment access for Mechanical and Electrical division. Provide up to three (3) 18"x 18" access doors, to be installed at locations coordinated with mechanical contractor.
2. Furnish inserts and anchoring devices that must be built into other work for installation of access doors

1.2 SUBMITTALS

- A. Product Data: For each type of access door and frame indicated. Include construction details, materials, individual components and profiles, and finishes.
- B. Shop Drawings: Show fabrication and installation details of access doors and frames for each type of substrate. Include plans, elevations, sections, details, and attachments to other work.
- C. Samples: For each door face material, at least 3 by 5 inches in size, in specified finish.
- D. Access Door and Frame Schedule: Provide complete access door and frame schedule, including types, locations, sizes, latching or locking provisions, and other data pertinent to installation.
- E. Ceiling Coordination Drawings: Reflected ceiling plans, drawn to scale, on which ceiling-mounted items including access doors and frames, lighting fixtures, diffusers, grilles, speakers, sprinklers, and special trim are shown and coordinated with each other.

1.3 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of access door(s) and frame(s) through one source from a single manufacturer.
- B. Size Variations: Obtain Architect's acceptance of manufacturer's standard-size units.

1.4 COORDINATION

- A. Verification: Determine specific locations and sizes for access doors needed to gain access to concealed plumbing, mechanical, or other concealed work, and indicate in the schedule specified in "Submittals" section 1.2 above.

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**PART 2 - PRODUCTS**

**2.1 STEEL MATERIALS**

- A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
  - 1. ASTM A 123/A 123M, for galvanizing steel and iron products.
  - 2. ASTM A 153/A 153M, for galvanizing steel and iron hardware.
- B. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.
  - 1. ASTM A 123/A 123M, for galvanizing steel and iron products
  - 2. ASTM A 153/A 153M, for galvanizing steel and iron hardware.
- C. Steel Sheet: electrolytic zinc-coated, ASTM A 591 with cold-rolled steel sheet substrate complying with ASTM A 1008, Commercial Steel (CS), exposed.
- D. Steel Finishes: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
  - 1. Surface Preparation for Steel Sheet: Clean surfaces to comply with SSPC-SP 1, "Solvent Cleaning," to remove dirt, oil, grease, or other contaminants that could impair paint bond. Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning," or SSPC-SP 8, "Pickling."
  - 2. Factory-Primed Finish: Apply shop primer immediately after cleaning and pretreating.
- E. Drywall Beads: Edge trim formed from 0.0299-inch zinc-coated steel sheet formed to receive joint compound and in size to suit thickness of gypsum board.

**2.2 ACCESS DOORS AND FRAMES FOR WALLS AND CEILINGS**

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Acudor Products, Inc.
  - 2. Babcock-Davis; A Cierra Products Co.
  - 3. Bar-Co, Inc. Div.; Alfab, Inc.
  - 4. Cendrex Inc.
  - 5. Dur-Red Products.
  - 6. Elmdor/Stoneman; Div. of Acorn Engineering Co.
  - 7. Jensen Industries.
  - 8. J. L. Industries, Inc.
  - 9. Karp Associates, Inc.
  - 10. Larsen's Manufacturing Company.
  - 11. MIFAB, Inc.
  - 12. Milcor Inc.
  - 13. Nystrom, Inc.

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14. Williams Bros. Corporation of America (The).

- B. Flush Access Doors and Frames with Exposed Trim: Fabricated from steel and stainless-steel sheet.
1. Locations: Wall and ceiling surfaces.
  2. Door: Minimum 0.060-inch- thick sheet metal, set flush with exposed face flange of frame.
  3. Frame: Minimum 0.060-inch- thick sheet metal with 1-inch- wide, surface-mounted trim.
  4. Hinges: Spring-loaded, concealed-pin type.
  5. Lock: Self-latching device with cylinder lock.

2.3 FABRICATION

- A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.
- B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.
- C. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access panels to types of supports indicated.
1. Exposed Flanges: Nominal 1 to 1-1/2 inches wide around perimeter of frame.
  2. Provide mounting holes in frames for attachment of units to metal or wood framing.
  3. Provide mounting holes in frame for attachment of masonry anchors.
- D. Latching Mechanisms: Furnish number required to hold doors in flush, smooth plane when closed.
1. For cylinder lock, furnish two keys per lock and key all locks alike.
  2. For recessed panel doors, provide access sleeves for each locking device. Furnish plastic grommets and install in holes cut through finish.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with manufacturer's written instructions for installing access doors and frames.
- B. Set frames accurately in position and attach securely to supports with plane of face panels aligned with adjacent finish surfaces.
- C. Install doors flush with adjacent finish surfaces or recessed to receive finish material.

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3.2 ADJUSTING AND CLEANING

- A. Adjust doors and hardware after installation for proper operation.
- B. Remove and replace doors and frames that are warped, bowed, or otherwise damaged.

END OF SECTION 083113

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SECTION 087100 - DOOR HARDWARE

PART 1- GENERAL

1.1 SUMMARY

A. Section Includes

1. Hardware for existing & hollow metal doors.

1.2 REFERENCES

- A. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
- B. ANSI A 156 - Door Hardware (ANSI/BHMA Standards)
- C. NFPA 80 - Fire Doors and Windows.
- D. AWI - Architectural Woodwork Institute - Architectural Wood Work Quality Standards.
- E. NFPA 101 - Code for Safety to Life from Fire in Buildings and Structures.
- F. NFPA 252 - Fire Tests of Door Assemblies.
- G. UL 10B - Safety Fire Tests of Door Assemblies.
- H.
- I. American Disabilities Act Accessibility Guidelines.
- J. BHMA - Builders Hardware Manufacturers Association - A156 Series.
- K. UL 305 - Safety Panic Hardware.

1.3 SUBMITTALS

- A. Submit under provisions of Division 01.
- B. Verification of Door and Hardware Schedule.
- C. Keying Information – sample submittal format follows this section.
- D. Key biting schedule data – sample format follows this section.

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- E. Submittal Sequence: Submit verified schedule at earliest possible date, particularly where acceptance of hardware schedule must precede fabrication of other work (e.g., hollow metal frames) which is critical in the project construction schedule. Include with schedule the product data, samples, shop drawings of other work affected by finish hardware, and other information essential to the coordinated review of hardware schedule.
- F. Keying Meeting and Schedule: Arrange for a keying meeting with the Architect and Owner, hardware supplier, and other involved parties prior to return of the reviewed finish hardware schedule, to ensure all locksets are functionally correct and keying fulfill the project requirements. As soon as possible after the keying conference, typed copies of the keying schedule shall be furnished to the Owner and Architect.
- G. Submittal Sequence: Submit schedule at earliest possible date particularly where acceptance of hardware schedule must precede fabrication of other work (e.g. hollow metal frames) which is critical in the project construction schedule. Include with schedule the product data, samples, shop drawings or other work affected by finish hardware, and other information essential to the coordinated review of hardware schedule. Allow 15 days minimum for review of the submittal.
- H. Keying Schedule: Meet with Park Area Manager and submit for subsequent approval by Washington State Parks & Recreation Commission, detailed schedule indicating clearly how the Parks final instructions on keying of locks has been fulfilled.
- I. Templates: Furnish hardware templates to each fabricator of door, frames and other work to be factory prepared for the installation of hardware. Check shop drawings of such other work to confirm that adequate provisions are made for proper location and installation of hardware.
- J. Contract Close-out Requirements.
  - 1. Project Record Documents.
    - a. Submit under provisions of Division 01.
    - b. Record actual locations of installed cylinders and their master key code.
  - 2. Operation and Maintenance Data
    - a. Submit under provisions of Division 01.
    - b. Maintenance Data: Include data on operating hardware, lubrication requirements, and inspection procedures related to preventative maintenance.

1.4 QUALITY ASSURANCE

- A. Perform work in accordance with the following requirements:
  - 1. ANSI A117.1
  - 2. NFPA 101.
  - 3. NFPA 252.

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4. American Disabilities Act Accessibility Guidelines.
5. BHMA - A115 Series.

**B. Qualifications**

1. Manufacturer: Obtain each type of hardware (latch and locksets, hinges, closers, etc.) from a single manufacturer, although several may be indicated as offering products complying with requirements.
2. Hardware Supplier: Company specializing in supplying commercial door hardware with 5 years documented experience, approved by manufacturer.

**C. Regulatory Requirements**

1. Conform to applicable code for requirements applicable to fire rated doors and frames.
2. Fire Rated Openings: Provide hardware for fire-rated openings in compliance with NFPA Standard No. 80 and local building code requirements.

**1.5 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver, store, protect and handle products to site under provisions of Division 01.
- B. Package hardware items individually; label and identify each package with door opening code to match hardware schedule.
- C. Deliver keys to Owner by security shipment direct from hardware supplier.
- D. Inventory hardware jointly with representatives of hardware supplier and hardware installer until each is satisfied that count is correct.
- E. Provide secure lock-up for hardware delivered to the project but not yet installed. Control handling and installation of hardware items which are not immediately replaceable so that completion of the work will not be delayed by hardware losses, both before and after installation.

**1.6 SEQUENCING AND SCHEDULING**

- A. Coordinate work under provisions of Division 01.
- B. Coordinate the work with other directly affected sections involving manufacture or fabrication of internal reinforcement for door hardware.

**1.7 EXTENDED WARRANTY**



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- A. Under provisions of Division -01. Include coverage for all hardware.
- B. Extended Warranty - Manufacturer's standard for individual item.

1.8 MAINTENANCE

- A. Provide under provisions of Division 01.
- B. Provide special wrenches and tools applicable to each different or special hardware component.
- C. Provide maintenance tools and accessories supplied by hardware component manufacturer.

PART 2 – PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Manufacturers: The numbers shown for the hardware items are taken from the catalogs of the manufacturers indicated and are for the purpose of establishing quality, design, and function. Except as listed as approved substitutes by item basis, no other manufacturer substitutions will be allowed unless approved by the Architect ten (10) days prior to bid opening. No substitutions will be allowed after bid opening.
- B. The numbers shown in the hardware groups are taken from the catalogs of the following manufacturers and are for the purpose of establishing quality, design and function. Except as listed, no substitution will be allowed unless approved by the Architect.

<u>ITEM</u>	<u>MANUFACTURER</u>	<u>APPROVED</u>
<u>SUBSTITUTE</u>		
Butts	Ives	Stanley, McKinney
Locksets, Latchsets	Schlage	None
Cylinders	Schlage	None
Closers	LCN	None
Wall Stops	Rockwood	Trimco
Protection Plates	Ives	Trimco, Rockwood
Thresholds	Pemko	Zero, National Guard
Door Bottoms	Pemko	Zero, National Guard
Gasketing	Pemko	Zero, National Guard

2.2 MATERIALS/PRODUCTS:

- A. Provide end products of one manufacturer for each item specified.

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- B. Finishes: BHMA 1301 Standards.
1. Provide matching finishes for hardware units at each door or opening, to the greatest extent possible, and except as otherwise indicated. Reduce differences in color and textures as much as commercially possible where the base metal or metal forming process is different for individual units of hardware exposed at the same door or opening. In general, match items to the manufacturer's standard finish for the latch and lockset (or push-pull units) for color and texture.
  2. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness and other qualities complying with manufacturer's standard, but in no case less than specified for the applicable units of hardware by referenced standards.
  3. The designations used in schedules and elsewhere to indicate hardware finishes are those listed in ANSI A156.18 "Materials and Finishes Standard" and Builders Hardware Manufacturer's Association (BHMA), including coordination with the traditional U.S. finishes shown by certain manufacturers for their products.
  4. Hardware in general to be BHMA 626 and /or 652, Satin Chromium Plated. Applicable Stainless Steel hardware shall be BHMA 630, Satin Stainless Steel.
  5. Door closers to be in plastic covers finished to match other hardware.
- D. Fasteners: Provide hardware manufactured to conform to published templates, generally prepared for machine screw installation. Do not provide hardware which has been prepared for self-tapping sheet metal screws, except as specifically indicated.
- E. Furnish screws for installation with each hardware item. Provide Phillips flat-head screws, except as otherwise indicated. Finish exposed (exposed under any condition) screws to match hardware finish, or, if exposed in surfaces of other work, to match finish of such other work as closely as possible, including "prepared for paint" in surfaces to receive painted finish.
- F. Provide concealed fasteners for hardware units which are exposed when door is closed, except when no standard units of type specified are available with concealed fasteners. Do not use through-bolts for installation where bolt head or nut on opposite face is exposed in other work, except where it is not feasible to adequately reinforce the work. In such cases, provide sleeves for each through-bolt or use hex screw fasteners.

2.3 KEYING

- A. Review the keying system with the Parks Area Manager and provide the type required (master, grandmaster or great-grandmaster), integrated with the existing system.
- B. Existing system is: Schlage. (No Substitution). Comply with Parks instructions for master keying, and, except as otherwise indicated; provide individual change keys for each lock which is not designated to be keyed alike with a group of related locks.
- C. Provide construction cores and keys during the construction period. Permanent cores and

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keys prepared according to the accepted keying schedule will be furnished to the owner by the local factory representative prior to occupancy. The Owner or Owner's agent will install permanent interchangeable cores and return the construction cores to the factory representative.

- D. All cylinders shall be keyed into the existing master key system.
- E. Furnish keys and related hardware in the following quantities:
  - 0. 6 each Master keys per set.
  - 1. 2 each Change keys each keyed core.
  - 2. 6 each Construction master keys.
  - 3. 4 each Grand master keys.
- F. Key all doors except passage, and noted interior vestibule doors.

2.4 HINGES

A. General

- 1. ANSI A 156J
- 2. Quantity per door leaf height (minimum):
  - 1 pair to 5'-0" high
  - 1-1/2 pair 5'-1" to 7'-7"
  - 2 pair 7'-7" to 10'-0"
- 3. Hinge height (minimum):
  - 4 1/2" to 3'-0" door width
  - 5" 3'-1" to 4'-0"
- 4. Hinge width (minimum): twice the door thickness, plus the jamb trim project at 180 degree swing.
- 5. Templates: Except for hinges and pivots to be installed entirely (both leaves) into wood doors and frames, provide only template produced units.
- 6. Screws: Furnish Phillips flat-head machine and/or wood screws for installation of units. Finish screw heads to match surface of hinges or pivots. Provide stainless steel fasteners on exterior doors.
- 7. Hinge Pins: Except as otherwise indicated, provide hinge pins as follows:
  - a. Steel Hinges - Steel pins.
  - b. Non-Ferrous Hinges - Stainless steel pins.
  - c. Out-Swinging Doors - Non-removable Pins(NRP).
  - d. Tips - Flat button and matching plug, finished to match leaves, except where hospital tip (HT) indicated.

B. Mortise Hinges

- 1. Full Mortise Hinges, 5-knuckle, flat button tip, anti-friction bearing type. Use Brass/Bronze type hinges on all exterior exposed doors.
- 2. Hinge A: High frequency use , heavy weight.
  - Ives: 5BB1HW Steel (640)
  - 5BB1HW Brass/Bronze (613)

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Hinge B: Average frequency used, standard weight  
Ives: 5BB1 Steel (640)  
5BB1 Brass/Bronze (613)

4. Other approved Manufacture's: Stanley, McKinney

2.5 LOCKSETS AND LATCHES

A. General

1. ANSI A156.13, Series 1000  
Grade 1
2. Features:
  - a. Lockset and Trim: BHMA 613 Finished.  
1) 17A Trim: (mortise)
  - b. Backset: 2-3/4 inch.
  - c. Strikes: Provide manufacturer's standard wrought box strike for each latch or lock  
bolt, with curved lip extended to protect frame, finished to match hardware.  
Latchbolt: 3/4" minimum throw.

B. Mortise & Cylindrical

1. Lockset x ANSI No. F81
2. ANSI No.

F75	Passage
F76	Privacy
F81	Entry/Office
F84	Classroom
F86	Storage/Mechanical
3. Basis of Design - Schlage, Other Approved Manufacturers:
  - a. None

2.6 CLOSERS

A. General

1. ANSI A156.4, Grade 7 ANSI  
A117.1 Accessibility Code
2. Provide closer on active leaf of non-rated paired doors.
3. Install closer on interior (push) side of door.
4. Size closer as per Manufacturer's recommendations.
5. Install thru-bolts with backer plates on all wood doors.
6. Provide parallel arm mounting ANSI/BHMA CO2021. Use regular arm mounting only where parallel mounting is not appropriate or recommended.
7. Provide heavy duty type arms.
8. Provide hold-open type arms when Indicated: see Hardware Schedule in Section 08 71 00.

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9. Covers: As listed; Color: STAT/DKBR2, BHMA 689.

B. Schedule:

	Item	Location	<u>LCN.</u>
1.	Closer A Door		4040XP

C. Other approved Manufacturer's: None

2.7 STOPS AND HOLDERS

A. General

1. ANSI A156.16  
ANSI A117.1 Accessibility code.
2. Fasteners
  - a. Machine screws and threaded anchors at concrete or masonry.
  - b. Self tapping screws at wood or metal framing.
3. Metal risers at carpet floors.

B. Schedule

1.	<u>Stop Wall</u>	WS402CVX 613	Ives
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2.8 DOOR PLATES

A. General

1. ANSI A 156.6
2. Stainless Steel ANSIBHMA 613 finished
3. Width of door leaf less 1 1/2" at single doors and less 2" at pairs
4. Solid Metal (0.050 inch), all edges beveled
5. Install on push side of door

B. Schedule:

1. Kickplate: width specified x 16" high Ives, Trimco

2.9 THRESHOLDS

A. General

1. ANSI A117.1, Accessibility Code
2. Aluminum, ANSIBBHMA 719 finished
3. Thermal Break
4. Stainless Steel Anchors

B. Schedule:

1. Threshold PEMKO

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2.10 WEATHERSTRIP AND SEALS

A. General

1. NFPA 80, 2-5.4 at fire rated and smoke assembly doors
2. Aluminum, ANSI/BHMA 719 finished
3. Seals, vinyl and silicone

B. Schedule:

- |    |            |       |       |
|----|------------|-------|-------|
| 1. | Door Seal  | S88D  | PEMKO |
| 2. | Door Sweep | 18062 | PEMKO |

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Verify site conditions under provisions of Division 01.
- B. Verify that doors and frames are ready to receive work and dimensions are as instructed by the Manufacturer.

3.2 INSTALLATION

- A. Mount hardware units at heights indicated in "Recommended Locations for Builders Hardware for Standard Steel Doors and Frames" by the Door and Hardware Institute, except as specifically indicated or required to comply with governing regulations, and except as may be otherwise directed by Architect.
- B. Use templates provided by hardware item manufacturer.
- C. Conform to ANSI 117.1 and American Disabilities Act Guidelines for positioning requirements for the handicapped.
- D. Install each hardware item in compliance with the manufacturer's instructions and recommendations. Wherever cutting and fitting is required to install hardware onto or into surfaces which are later to be painted-or finished in another way, coordinate removal, storage and reinstallation or application of surface protection with finishing work specified in the Division 09 sections. Do not install surface-mounted items until finishes have been completed on the substrate.
- E. Set units level, plumb and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.
- F. Drill and countersink units which are not factory prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.
- G. Set supporting elements of thresholds for exterior doors in full bed of sealant as specified in Section 07 92 00.

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3.3 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of Division 01.
- B. Architectural Hardware Consultant to inspect finished installation and certify that hardware and installation has been furnished and installed in accordance with manufacturer's instructions and, as specified.

3.4 ADJUST AND CLEAN

- A. Final Adjustment: Wherever hardware installation is made more than one month prior to acceptance or occupancy of a space or area, return to the work during the week prior to punch list, acceptance or occupancy, and make final check and adjustments of all hardware items in such space or area. Clean operating items as necessary to restore proper function and finish of hardware and doors. Adjust door control devices to compensate for final operation of heating and ventilating equipment.
- B. Continued Maintenance Service: Approximately six months after the acceptance of hardware in each area and before substantial completes the installer, accompanied by representatives of the latch and lock, exit device, and closer manufacturers, shall return to the project and re-adjust every item of hardware to restore proper function of doors and hardware, and to consult with and instruct Owner's personnel in recommended additions to the maintenance procedures. Replace hardware items which have deteriorated or failed due to faulty design, materials, or installation of hardware units. Prepare a written report of current and predictable problems (of substantial nature) in the performance of the hardware.

3.5 HARDWARE SCHEDULE

- HW1** Single existing exterior historical wood door
- 1 modify existing door and hardware set to allow disabled access
- 1 ea Permanent Core 20-740XP 613 D145
- 1 ea Closer 4040XP SCUSH 695 x 4040-61 x 4040-30, verify finish with architect
- 1 ea Threshold 1715DK
- 1 ea Door Sweep 18062CNB
- 1 set Gasket S88D

Note: existing exterior entry door is a contributing historical feature to the building.

- HW2** Single interior hollow metal service door
- 3 ea Hinges 5BB1HW 613 4 1/2 x 4 1/2 NRP
- 1 ea Lockset L9070J 17A 613
- 1 ea Permanent Core 20-740XP 613 D145
- 1 ea Closer 4040XP SCUSH 695 x 4040-61 x 4040-30
- 1 set Gasket S88D
- 1 ea Floor Stop 441 613

END OF SECTION 087100

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SECTION 092900 - GYPSUM BOARD

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Interior gypsum board.
2. Taped and sanded joint treatment
3. Texture finish
4. Installation of acoustical sealant specified in Section 07 92 00, at sound rated walls
5. Installation of access doors specified in Section 08 31 13

1.2 SUBMITTALS

A. Product Data: For each type of product indicated. Provide certification that all drywall materials to be incorporated into the project are manufactured in the USA.

B. Samples: For the following products:

1. Trim Accessories: Full-size Sample in 12-inch- long length for each trim accessory indicated.
2. Textured Finishes: Manufacturer's standard size for each textured finish indicated and on same backing indicated for Work.

1.3 QUALITY ASSURANCE

A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

1.4 STORAGE AND HANDLING

A. Store materials inside under cover and keep them dry and protected against damage from weather, condensation, direct sunlight, construction traffic, and other causes. Stack panels flat to prevent sagging.

1.5 PROJECT CONDITIONS

A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.

B. Do not install interior products until installation areas are enclosed and conditioned.

C. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.



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PART 2 - PRODUCTS

2.1 PANELS, GENERAL

- A. Size: Provide in maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.
- B. General: Complying with ASTM C 36 or ASTM C 1396, as applicable to type of gypsum board indicated and whichever is more stringent.
- C. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. National Gypsum Company – basis of design
  - 2. American Gypsum Co. – products equal to basis of design
  - 3. BPB America Inc. – products equal to basis of design
  - 4. Certainteed – products equal to basis of design
  - 5. G-P Gypsum – products equal to basis of design
  - 6. Lafarge North America Inc. – products equal to basis of design
  - 7. PABCO Gypsum – products equal to basis of design
  - 8. USG Corporation – products equal to basis of design
- D. All drywall materials incorporated into the project shall be manufactured in the USA.

2.2 MOLD AND MOISTURE RESISTANT GYPSUM BOARD; Use in all locations.

- A. Basis of Design: Gold Bond® BRAND XP Gypsum Board
  - 1. Panel Physical Characteristics
    - a. Core: Mold and moisture resistant gypsum core
    - b. Surface paper: 100 percent recycled content moisture/mold/mildew resistant paper on front, back, and long edges
    - c. Long Edges: Tapered
    - d. Overall thickness: 1/2 inch
    - e. Panel complies with requirements of ASTM C 1396
    - f. Mold/Mildew Resistance: 10 when tested in accordance with ASTM D 3273
    - g. Environmental Requirements: Provide products that comply with testing and product requirements for low emitting materials

2.3 TRIM ACCESSORIES

- A. Interior Trim: At all joint locations not defined in interior elevation drawings, joint system complying with ASTM C 1047.
  - 1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized steel sheet.
  - 2. Shapes:
    - a. Cornerbead.

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- b. LC-Bead: J-shaped; exposed long flange receives joint compound.
- c. L-Bead: L-shaped; exposed long flange receives joint compound.
- d. U-Bead: J-shaped; exposed short flange does not receive joint compound.
- e. Expansion (control) joint.

### 2.4 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C 475/C 475M.
- B. Joint Tape:
  - 1. Interior Gypsum Wallboard: Paper.
  - 2. Exterior Gypsum Soffit Board: Paper.
  - 3. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass mesh.
  - 4. Tile Backing Panels: As recommended by panel manufacturer.
- C. Joint Compound for Interior Gypsum Wallboard: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.
  - 1. Prefilling: At open joints and damaged surface areas, use setting-type taping compound.
  - 2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.
    - a. Use setting-type compound for installing paper-faced metal trim accessories.
  - 3. Fill Coat: For second coat, use setting-type, sandable topping compound.
  - 4. Finish Coat: For third coat, use setting-type, sandable topping compound.
  - 5. Skim Coat: For final coat of Level 5 finish, use setting-type, sandable topping compound.
- D. Joint Compound for Exterior Applications:
  - 1. Exterior Gypsum Soffit Board: Use setting-type taping compound and setting-type, sandable topping compound.
  - 2. Glass-Mat Gypsum Sheathing Board: As recommended by sheathing board manufacturer.
- E. Joint Compound for Tile Backing Panels:
  - 1. Water-Resistant Gypsum Backing Board: Use setting-type taping compound and setting-type, sandable topping compound.
  - 2. Glass-Mat, Water-Resistant Backing Panel: As recommended by backing panel manufacturer.
  - 3. Cementitious Backer Units: As recommended by backer unit manufacturer.

### 2.5 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.
- B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.
  - 1. Use adhesives that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- C. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.
  - 1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch thick.

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2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.
  - D. Acoustical Sealant: As specified in Division 07 Section 079200 Joint Sealants.
    1. Provide sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
  - E. Thermal Insulation: As specified in Division 07 Sections 072116 and 072129.
  - F. Vapor Retarder: As specified in Division 07 Sections 072116 and 072129.
- 2.6 TEXTURE FINISHES
- A. Reference and coordinate with Division 09 "Painting" for products and sequence of primer and gypsum board texture finishes.
  - B. Primer: As recommended by textured finish manufacturer.

**PART 3 - EXECUTION**

3.1 EXAMINATION

- A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames and framing, for compliance with requirements and other conditions affecting performance.
- B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLYING AND FINISHING PANELS, GENERAL

- A. Comply with ASTM C 840.
- B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
- C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.
- D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.
- E. Form control and expansion joints with space between edges of adjoining gypsum panels.
- F. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- wide spaces at these locations, and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical

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sealant.

### 3.3 APPLYING INTERIOR GYPSUM BOARD

- A. Install interior gypsum board in the following locations:
1. Type X: As indicated on Drawings, typical product for use unless noted otherwise in specifications or drawings.
  2. Ceiling Type: As indicated on Drawings.
  3. Water-, Moisture- and Mold-Resistant Type: As indicated on Drawings, and use throughout rooms at all Restrooms, Locker Rooms, Kitchens, Janitor Closets, and within 6'-0" of the center line of any plumbing fixture in other locations. Install 24 inches in height continuously at all ceramic wall tile base locations.
- B. Single-Layer Application:
1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing, unless otherwise indicated.
  2. On partitions/walls, apply gypsum panels vertically (parallel to framing) unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
    - a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
    - b. At stairwells and other high walls, install panels horizontally, unless otherwise indicated or required by fire-resistance-rated assembly.
  3. On Z-furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
  4. Fastening Methods: Apply gypsum panels to supports with steel drill screws.
- C. Laminating to Substrate: Where gypsum panels are indicated as directly adhered to a substrate (other than studs, joists, furring members, or base layer of gypsum board), comply with gypsum board manufacturer's written recommendations and temporarily brace or fasten gypsum panels until fastening adhesive has set.

### 3.4 INSTALLING TRIM ACCESSORIES

- A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
- B. Interior Trim: Install in the following locations:
1. Cornerbead: Use at outside corners, unless otherwise indicated.
  2. LC-Bead: Use at exposed panel edges.
  3. L-Bead: Use where indicated.
  4. U-Bead: Use at exposed panel edges.
  5. Curved-Edge Cornerbead: Use at curved openings.
- C. Aluminum Trim: Install in locations indicated on Drawings. Install in accordance with trim manufacturers recommendations and requirements.

### 3.5 FINISHING GYPSUM BOARD

- A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration.

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Promptly remove residual joint compound from adjacent surfaces.

- B. Prefill open joints, rounded or beveled edges, and damaged surface areas.
- C. Apply joint tape over gypsum board joints, except those with trim having flanges not intended for tape.
- D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:
  - 1. Level 1: not used
  - 2. Level 2: Ceiling plenum areas, concealed areas, and where indicated.
  - 3. Level 3: not used.
  - 4. Level 4: not used
  - 5. Level 5: Smooth wall final texture, at all panel surfaces that will be exposed to view, unless otherwise indicated.
    - a. Primer and its application to surfaces are specified in other Division 09 Sections.

### 3.6 APPLYING TEXTURE FINISHES

- A. Surface Preparation and Primer: In accordance with 09 91 00 Painting, prepare and apply base coat primer to gypsum panels and other surfaces prior to applying texture finishes. Apply primer to surfaces that are clean, dry, and smooth per Painting Specification.
- B. Final texture Finish Application: Mix and apply finish using powered spray equipment, to produce a uniform texture matching approved mockup and free of starved spots or other evidence of thin application or of application patterns.
- C. Prevent texture finishes from coming into contact with surfaces not indicated to receive texture finish by covering them with masking agents, polyethylene film, or other means. If, despite these precautions, texture finishes contact these surfaces, immediately remove droppings and overspray to prevent damage according to texture-finish manufacturer's written recommendations.
- D. Finish Primer: In accordance with 09 91 00 Painting, prepare and apply top coat primer to gypsum panels and other surfaces after applying texture finishes. Apply finish primer to surfaces that are clean, dry, and smooth per Painting specification.

### 3.7 PROTECTION

- A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- B. Remove and replace panels that are wet, moisture damaged, and mold damaged.
  - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
  - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 09 29 00

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SECTION 093000 – TILING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Ceramic Glazed wall tile.
2. Waterproof membrane for thin-set tile installations.
3. Crack-suppression membrane for thin-set tile installations.
4. Metal edge strips installed as part of tile installations at all outside corners.

1.2 DEFINITIONS

- A. Module Size: Actual tile size (minor facial dimension as measured per ASTM C 499) plus joint width indicated.
- B. Facial Dimension: Actual tile size (minor facial dimension as measured per ASTM C 499).
- C. Facial Dimension: Nominal tile size as defined in ANSI A137.1.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples:
1. 3 Full-size units of each type and composition of tile and for each color and finish required.
  2. Assembled samples for each type and composition of tile and for each color and finish required, at least 12 inches square and mounted on rigid panel.
  3. Full-size units of each type of trim and accessory for each color and finish required.
  4. Metal edge strips in 6-inch lengths.
- C. Master Grade Certificates: For each shipment, type, and composition of tile, signed by tile manufacturer and Installer.
- D. Product Certificates: For each type of product, signed by product manufacturer.
- E. Qualification Data: For Installer.
- F. Material Test Reports: For each tile-setting and -grouting product.

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1.4 QUALITY ASSURANCE

- A. Source Limitations for Tile: Obtain all tile of same type and color or finish from one source or producer.
  - 1. Obtain tile from same production run and of consistent quality in appearance and physical properties for each contiguous area.
- B. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from a single manufacturer and each aggregate from one source or producer.
- C. Source Limitations for Other Products: Obtain each of the following products specified in this Section through one source from a single manufacturer for each product:
  - 1. Waterproofing.
  - 2. Joint sealants.
  - 3. Metal edge strips.
- D. Mockups: Build mockups to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution.
  - 1. Build mockup of each type of wall tile installation.
  - 2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirement in ANSI A137.1 for labeling sealed tile packages.
- B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
- D. Store liquid latexes and emulsion adhesives in unopened containers and protected from freezing.
- E. Handle tile that has temporary protective coating on exposed surfaces to prevent coated surfaces from contacting backs or edges of other units. If coating does contact bonding surfaces of tile, remove coating from bonding surfaces before setting tile.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

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1.7 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Tile and Trim Units: Furnish quantity of full-size units equal to 2 percent of amount installed, for each type, composition, color, pattern, and size indicated but no less than 10 full size units of each.

PART 2 - PRODUCTS

2.1 PRODUCTS, GENERAL

- A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1, "Specifications for Ceramic Tile," for types, compositions, and other characteristics indicated.
  - 1. Provide tile complying with Standard grade requirements, unless otherwise indicated.
  - 2. For facial dimensions of tile, comply with requirements relating to tile sizes specified in Part 1 "Definitions" Article.
- B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI standards referenced in "Setting and Grouting Materials" Article.
- C. Colors, Textures, and Patterns: Where manufacturer's standard products are indicated for tile, grout, and other products requiring selection of colors, surface textures, patterns, and other appearance characteristics, provide specific products or materials complying with the following requirements:
  - 1. As indicated by manufacturer's designations in the Finish Schedule and Finish Material Designations.
- D. Factory Blending: For tile exhibiting color variations within ranges selected during Sample submittals, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.
- E. Mounting: For factory-mounted tile, provide back- or edge-mounted tile assemblies as standard with manufacturer, unless otherwise indicated.
  - 1. Where tile is indicated for installation in wet areas, do not use back- or edge-mounted tile assemblies unless tile manufacturer specifies in writing that this type of mounting is suitable for installation indicated and has a record of successful in-service performance.
- F. Factory-Applied Temporary Protective Coating: Where indicated under tile type, protect exposed surfaces of tile against adherence of mortar and grout by precoating with continuous film of petroleum paraffin wax, applied hot. Do not coat unexposed tile surfaces.



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2.2 TILE PRODUCTS

A. Available Manufacturers, See section 09 30 00 2.2 B for specific product. Subject to substitution request, the following manufacture's may be acceptable:

1. Daltile; Div. of Dal-Tile International Inc.
2. American Marazzi Tile, Inc.
3. American Olean; Div. of Dal-Tile International Corp.
4. Buchtal Corporation USA.
5. Cerim-Floor Gres Ceramiche.
6. Crossville Ceramics Company, L.P.
7. Florida Tile Industries, Inc.
8. GranitiFiandre.
9. Interceramic.
10. KPT, Inc.
11. Laufen USA.
12. Lone Star Ceramics Company.
13. Metropolitan Ceramics.
14. Monarch Tile, Inc.
15. Porcelanite, Inc.
16. Seneca Tiles, Inc.
17. Summitville Tiles, Inc.
18. United States Ceramic Tile Company.
19. Winburn Tile Manufacturing Company.
20. Olympia Tile & Stone

B. **Restroom Wall Tile** - Types TILE-1 Ceramic Tile:

1. Composition: Vitreous or impervious natural clay or porcelain as indicated.
2. Module Size: 6"x 6",
3. Thickness: 5/16"
4. Face: running bond as indicated, with cushion edges.
5. Finish: Glossy
6. Grout Joint, 1/16"
7. Basis-of-Design Product: American Olean, Color Story Wall tile' Balance #0014 color, confirm color with Architect and Owner prior to order.

C. Trim Units: Matching characteristics of adjoining flat tile and coordinated with sizes and coursing of adjoining flat tile where applicable. Provide shapes to coordinate with installation condition for all tile types listed above, selected from manufacturer's standard shapes:

1. Bottom edge of tile, metal edge trim.
2. Wainscot Cap for Thin-Set Mortar Installations: Surface bullnose, module size to coordinate with wall tile
3. External Corners for Thin-Set Mortar Installations: Metal edge trim with square edge tile abutted to it.
4. Internal Corners: Field-buttet square corners except with coved base and cap angle pieces designed to fit with stretcher shapes.
5. Vertical edges of tile at transitions to other wall finishes: Metal edge trim.

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2.3 WATERPROOFING AND CRACK-SUPPRESSION MEMBRANES FOR THIN-SET TILE INSTALLATIONS

- A. General: Manufacturer's standard product that complies with ANSI A118.10.

2.4 SETTING AND GROUTING MATERIALS

- A. Available Manufacturers:

1. Arderx.
2. Atlas Minerals & Chemicals, Inc.
3. Boiardi Products Corporation.
4. Bonsal, W. R., Company.
5. Bostik.
6. C-Cure.
7. Custom Building Products.
8. DAP, Inc.
9. Jamo Inc.
10. LATICRETE International Inc.
11. MAPEI Corporation.
12. Southern Grouts & Mortars, Inc.
13. Summitville Tiles, Inc.
14. TEC Specialty Products Inc.

- B. Latex-Portland Cement Mortar (Thin Set): ANSI A118.4, consisting of the following:

1. Prepackaged dry-mortar mix containing dry, redispersible, ethylene vinyl acetate additive to which only water must be added at Project site.
2. Prepackaged dry-mortar mix combined with acrylic resin liquid-latex additive.
  - a. For wall applications, provide nonsagging mortar that complies with Paragraph F-4.6.1 in addition to the other requirements in ANSI A118.4.

- C. Water-Cleanable, Tile-Setting Epoxy Adhesive: ANSI A118.3, with a VOC content of 65 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

- D. All Grout: Factory blend of epoxy base, Portland cement and additives.

- a. Unsanded grout mixture for joints 1/8 inch and narrower.
- b. Color: Basis of Design Ardex Grout, Cast Iron color #22, confirm color with architect and owner prior to ordering.

2.5 ELASTOMERIC SEALANTS

- A. General: Provide manufacturer's standard chemically curing, elastomeric sealants of base polymer and characteristics indicated that comply with applicable requirements in Division 07 Section "Joint Sealants."

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1. Use sealants that have a VOC content of [250] <Insert limit> g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- B. Colors: Provide colors of exposed sealants to match colors of grout in tile adjoining sealed joints, unless otherwise indicated.
- C. One-Part, Mildew-Resistant Silicone Sealant: ASTM C 920; Type S; Grade NS; Class 25; Uses NT, G, A, and, as applicable to nonporous joint substrates indicated, O; formulated with fungicide, intended for sealing interior ceramic tile joints and other nonporous substrates that are subject to in-service exposures of high humidity and extreme temperatures.
  1. Available Products:
    - a. Dow Corning Corporation; Dow Corning 786.
    - b. GE Silicones; Sanitary 1700.
    - c. Pecora Corporation; Pecora 898 Sanitary Silicone Sealant.
    - d. Tremco, Inc.; Tremsil 600 White.

2.6 MISCELLANEOUS MATERIALS

- A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.
- B. Metal Edge Strips: Angle or L-shape, height to match tile and setting-bed thickness, metallic or combination of metal and PVC or neoprene base, designed specifically for tile location applications, stainless steel; ASTM A 666, 300 Series exposed-edge material.
- C. Temporary Protective Coating: Either product indicated below that is formulated to protect exposed surfaces of tile against adherence of mortar and grout; compatible with tile, mortar, and grout products; and easily removable after grouting is completed without damaging grout or tile.
  1. Petroleum paraffin wax, fully refined and odorless, containing at least 0.5 percent oil with a melting point of 120 to 140 deg F per ASTM D 87.
  2. Grout release in form of manufacturer's standard proprietary liquid coating that is specially formulated and recommended for use as temporary protective coating for tile.
- D. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.
- E. Grout Sealer: Manufacturer's standard product for sealing grout joints that does not change color or appearance of grout.
  1. Available Products:
    - a. Bonsal, W. R., Company; Grout Sealer.
    - b. Bostik; CeramaSeal Grout Sealer.
    - c. C-Cure; Penetrating Sealer 978.
    - d. Custom Building Products; Surfaceguard Grout and Tile Sealer.
    - e. Jamo Inc.; Penetrating Sealer.

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- f. MAPEI Corporation; KER 004, Keraseal Penetrating Sealer for Unglazed Grout and Tile.
- g. Southern Grouts & Mortars, Inc.; Silicone Grout Sealer.
- h. Summitville Tiles, Inc.; SL-15, Invisible Seal Penetrating Grout and Tile Sealer.
- i. TEC Specialty Products Inc.; TA-256 Penetrating Silicone Grout Sealer.

2.7 MIXING MORTARS AND GROUT

- A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.
- B. Add materials, water, and additives in accurate proportions.
- C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.
  - 1. Verify that substrates for setting tile are firm; dry; clean; free of oil, waxy films, and curing compounds; and within flatness tolerances required by referenced ANSI A108 Series of tile installation standards for installations indicated.
  - 2. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed before installing tile.
  - 3. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Remove coatings, including curing compounds and other substances that contain soap, wax, oil, or silicone, that are incompatible with tile-setting materials.
- B. Blending: For tile exhibiting color variations within ranges selected during Sample submittals, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.
- C. Field-Applied Temporary Protective Coating: Where indicated under tile type or needed to prevent grout from staining or adhering to exposed tile surfaces, precoat them with continuous

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film of temporary protective coating, taking care not to coat unexposed tile surfaces.

**3.3 INSTALLATION, GENERAL**

- A. ANSI Tile Installation Standards: Comply with parts of ANSI A108 Series "Specifications for Installation of Ceramic Tile" that apply to types of setting and grouting materials and to methods indicated in ceramic tile installation schedules.
- B. TCA Installation Guidelines: TCA's "Handbook for Ceramic Tile Installation." Comply with TCA installation methods indicated in ceramic tile installation schedules.
- C. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions, unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
- D. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.
- E. Jointing Pattern: Lay tile in running bond pattern. Lay out tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths, unless otherwise indicated.
- F. Lay out tile wainscots to next full tile beyond dimensions indicated.
- G. Expansion Joints: Locate expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.
  - 1. Locate joints in tile surfaces directly above joints in concrete substrates.
  - 2. Prepare joints and apply sealants to comply with requirements in Division 07 Section "Joint Sealants."
- H. Grout tile to comply with requirements of the following tile installation standards:
  - 1. For ceramic tile grouts (sand-portland cement; dry-set, commercial portland cement; and latex-portland cement grouts), comply with ANSI A108.10.

**3.4 WATERPROOFING AND CRACK-SUPPRESSION MEMBRANE INSTALLATION**

- A. Install waterproofing to comply with ANSI A108.13 and waterproofing manufacturer's written instructions to produce waterproof membrane of uniform thickness bonded securely to substrate. Install under all wall tile.
- B. Install crack-suppression membrane to comply with manufacturer's written instructions to produce membrane of uniform thickness bonded securely to substrate.

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- C. Do not install tile over waterproofing until waterproofing has cured and been tested to determine that it is watertight.

3.5 WALL TILE INSTALLATION

- A. Install types of tile designated for wall installations to comply with requirements in the Wall Tile Installation Schedule, including those referencing TCA installation methods.
- B. Joint Widths: Install tile on walls with the following joint widths:
  - 1. Ceramic Tile: 1/16 inch.

3.6 CLEANING AND PROTECTING

- A. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
  - 1. Remove grout residue from tile as soon as possible.
  - 2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions, but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.
  - 3. Remove temporary protective coating by method recommended by coating manufacturer that is acceptable to tile and grout manufacturer. Trap and remove coating to prevent it from clogging drains.
- B. Before final inspection, remove protective coverings and rinse neutral cleaner from tile surfaces.

END OF SECTION 093000

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SECTION 096513 - RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Resilient base, install at new wall in Room 102A.

1.2 SUBMITTALS

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

1.3 DELIVERY, STORAGE, AND HANDLING

- A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F.

1.4 PROJECT CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive resilient products during the following time periods:
1. 48 hours before installation.
  2. During installation.
  3. 48 hours after installation.
- B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.
- C. Install resilient products after other finishing operations, including painting, have been completed.

1.5 EXTRA MATERIALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Furnish not less than 10 linear feet for every 300 linear feet or fraction thereof, of each type, color, pattern, and size of resilient product installed.

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**PART 2 - PRODUCTS**

**2.1 RESILIENT BASE**

**A. Resilient Base:**

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Armstrong World Industries, Inc.
  - b. Burke Mercer Flooring Products; Division of Burke Industries, Inc.
  - c. Endura Rubber Flooring; Division of Burke Industries, Inc.
  - d. Flexco, Inc.
  - e. Johnsonite.
  - f. Mondo Rubber International, Inc.
  - g. Musson, R. C. Rubber Co.
  - h. Nora Rubber Flooring; Freudenberg Building Systems, Inc.
  - i. Roppe Corporation, USA.

**B. Resilient Base Standard: ASTM F 1861.**

1. Material Requirement: Type TS (rubber, vulcanized thermoset) or Type TP (rubber, thermoplastic).
2. Manufacturing Method: Group I (solid, homogeneous) or Group II (layered).
3. Style: Cove (base with toe), and Straight (base without toe).

**C. Minimum Thickness: 0.125 inch.**

**D. Height: 6 inches with cove base at all wet areas (Room 102A).**

**E. Lengths: Coils in manufacturer's standard length.**

**F. Finish: Matte.**

**G. Colors and Patterns: Charcoal Gray.**

**2.2 INSTALLATION MATERIALS**

**A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.**

**B. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.**

1. Use adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
  - a. Cove Base Adhesives: Not more than 50 g/L.



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**PART 3 - EXECUTION**

**3.1 EXAMINATION**

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

**3.2 PREPARATION**

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
- B. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.
- C. Do not install resilient products until they are same temperature as the space where they are to be installed.
  - 1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.
- D. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

**3.3 RESILIENT BASE INSTALLATION**

- A. Comply with manufacturer's written instructions for installing resilient base.
- B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
- C. Install resilient base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.
- D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- E. Do not stretch resilient base during installation.

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- F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.

3.4 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protection of resilient products.
- B. Perform the following operations immediately after completing resilient product installation:
  - 1. Remove adhesive and other blemishes from exposed surfaces.
  - 2. Sweep and vacuum surfaces thoroughly.
  - 3. Damp-mop surfaces to remove marks and soil.
- C. Protect resilient products from marks, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. Cover resilient products until Substantial Completion.

END OF SECTION 096513

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SECTION 099100 – PAINTING

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes

1. All surface preparation throughout the project
2. All site-applied painting and clear finish application on the project, including Site, Mechanical, and Electrical areas of work.
3. Surface finish schedule.

B. Related Sections

1. Mechanical items: Painting of anchors/hangers, piping, mechanical equipment, ductwork, insulation, etc. shall be performed by this section except where specifically stated otherwise in Division 22, or 23. All paint materials and methods, regardless of installer, shall meet the requirements set forth in Section 09 91 00 for Products and Execution. Upon completion of the project, all materials exposed to view shall be painted.
2. Electrical items: Painting of anchors/hangers, piping, mechanical equipment, ductwork, insulation, etc. shall be performed by this section except where specifically stated otherwise in Division 26. All paint materials and methods, regardless of installer, shall meet the requirements set forth in Section 09 91 00 for Products and Execution. Upon completion of the project, all materials exposed to view shall be painted.

1.2 REFERENCES

- A. ASTM D 16 - Terminology Relating to Paint, Varnish, Lacquer, and Related Products.
- B. ASTM D 2016 - Test Method for Moisture Content of Wood.
- C. ASTM E 84 - Test Method for Surface Burning Characteristics of Building Materials.

1.3 SUBMITTALS

- A. Submit product data under provisions of Division 01.
- B. Provide product data on all finishing products.
- C. Submit three (3) 8”x 10” paint draw downs of each specified paint material in each specified color and sheen

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- D. Sustainable Design Criteria: For coatings, paints, interior primers, stains, and transparent finishes, including printed statement of VOC content and chemical components. Interior paint shall comply with Green Seal GS-11 Standard.

1.4 QUALITY ASSURANCE

A. Qualifications

1. Product Manufacturer: Company specializing in manufacturing quality paint and finish products with three years experience.
2. Applicator: Company specializing in commercial painting and finishing approved by product manufacturer.

B. Field Samples

1. Provide samples under provisions of Division 01.
2. Before proceeding with paint application, finish one complete typical wall with trim, door frames, doors, etc. of each paint type and color scheme required, clearly indicating selected colors, finish texture, materials and workmanship
2. Provide field sample panel, on at least 100-sq. ft. of surface until required sheen, color and texture are achieved.
3. Locate where directed.
4. Once each scheme has written approval of the Architect and the Owner, sample may remain as part of the Work.
5. If approved, sample area will serve as a minimum standard for workmanship throughout work

C. Regulatory Requirements

1. Conform to ASTM E 84 for flame/smoke rating requirements for finishes.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site under provisions of Division 01.
- B. Store and protect products under provisions of Division 01.
- C. Deliver products to site in sealed and labeled containers; inspect to verify acceptance.
- D. Container labeling to include manufacturer's name, type of paint, brand name, brand code, coverage, surface preparation, drying time, cleanup, color designation, and instructions for mixing and reducing.
- E. Store paint materials at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in well ventilated area, unless required otherwise by manufacturer's instructions.

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- F. Take precautionary measures to prevent fire hazards and spontaneous combustion.

**1.6 PROJECT/SITE CONDITIONS**

- A. Provide continuous ventilation and heating facilities to maintain surface and ambient temperatures above 50 degrees for 24 hours before, during, and 48 hours after application of finishes, unless required otherwise by manufacturer's instructions.
- B. Do not apply exterior coatings during rain or snow, or when relative humidity is above 85 percent unless required otherwise by manufacturer's instructions.
- C. Minimum Application Temperatures for Latex Paints: 50 degrees F; unless required otherwise by manufacturer's instructions.
- D. Minimum Application Temperature for Varnish Finishes: 65 degrees F, unless required otherwise by manufacturer's instructions.
- E. Provide lighting level of 80-ft candles measured mid-height at substrate surface.

**1.7 SPECIAL WARRANTY**

- A. Under provisions of Division 01.
- B. Provide Manufacturer's Standard Material Warranty.

**1.8 MAINTENANCE**

- A. Extra Stock: provide (1) gallon of each type and color of paint or coating used.
- B. Clear mark on each container of extra stock the manufacturer, product, supplier source, and surface location that the finish was applied for the material. Include the same information on cover sheet of O&M manual section for Paints.

**PART 2 - PRODUCTS**

**2.1 MANUFACTURERS**

- A. PAINT, STAIN, AND URETHANE
  - 1. Sherwin-Williams Company
  - 2. Columbia Paint Corporation
  - 3. Pittsburgh Paints
  - 4. Benjamin Moore
  - 5. Parker Paints

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- 6. Dupont
  
- B. EXTERIOR CLEAR FINISHED WOOD
  - 1. Sikkens Cetol system
- C. PAINTED/SEALED CONCRETE FLOORS
  - 1. Sherwin Williams Armorseal seal finish system
  
- D. Substitutions: Under provisions of Division 01.

2.2 MATERIALS

- A. Coatings: Ready mixed, except field catalyzed coatings. Process pigments to a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating.
  
- B. Coatings: Good flow and brushing properties; capable of drying or curing free of streaks or sags.
  
- C. Provide a tint variation between all under coats and the final coat.
  
- D. Accessory Materials: Linseed oil, shellac, turpentine, paint thinners and other materials not specifically indicated but required to achieve the finishes specified, of commercial quality.
  
- E. Refer to schedule at end of Section for surface finishes.
  
- F. VOC Content of Field-Applied Interior Primers, Paints, Coatings, Stains, and Transparent Finishes: Provide products that comply with the following limits for VOC content, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24); these requirements do not apply to paints and coatings that are applied in a fabrication or finishing shop:
  - 1. Flat Paints, Coatings, and Primers: VOC content of not more than 50 g/L.
  - 2. Nonflat Paints, Coatings, and Primers: VOC content of not more than 150 g/L.
  - 3. Anti-Corrosive and Anti-Rust Paints Applied to Ferrous Metals: VOC content not more than 250 g/L.
  - 4. Floor Coatings: VOC content not more than 100 g/L.
  - 5. Shellacs, Clear: VOC content not more than 730 g/L.
  - 6. Shellacs, Pigmented: VOC content not more than 550 g/L.
  - 7. Clear Wood Finishes, Varnishes: VOC content not more than 350 g/L.
  - 8. Clear Wood Finishes, Lacquers: VOC content not more than 550 g/L.
  - 9. Stains: VOC content not more than 250 g/L.
  
- G. Chemical Components of Field-Applied Interior Paints and Coatings: Provide topcoat paints and anti-corrosive and anti-rust paints applied to ferrous metals that comply with the following chemical restrictions; these requirements do not apply to paints and coatings that are applied in a fabrication or finishing shop.

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1. Aromatic Compounds: Paints and coatings shall not contain more than 1.0 percent by weight of total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).
2. Restricted Components: Paints and coatings shall not contain any of the following:
  - a. Acrolein.
  - b. Acrylonitrile.
  - c. Antimony.
  - d. Benzene.
  - e. Butyl benzyl phthalate.
  - f. Cadmium.
  - g. Di (2-ethylhexyl) phthalate.
  - h. Di-n-butyl phthalate.
  - i. Di-n-octyl phthalate.
  - j. 1,2-dichlorobenzene.
  - k. Diethyl phthalate.
  - l. Dimethyl phthalate.
  - m. Ethylbenzene.
  - n. Formaldehyde.
  - o. Hexavalent chromium.
  - p. Isophorone.
  - q. Lead.
  - r. Mercury.
  - s. Methyl ethyl ketone.
  - t. Methyl isobutyl ketone.
  - u. Methylene chloride.
  - v. Naphthalene.
  - w. Toluene (methylbenzene).
  - x. 1,1,1-trichloroethane.
  - y. Vinyl chloride.

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

- A. Verify that substrate is 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. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
  1. Gypsum Wallboard: 12 percent.
  2. Masonry, Concrete, and Concrete Unit Masonry: 12 percent.
  3. Interior Located Wood: 15 percent, measured in accordance with ASTM D 2016.
  4. Concrete Floors: 12 percent.
  5. Beginning of installation indicates acceptance of substrate.

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- D. Ensure surface temperatures or the surrounding air temperature is above 45 deg F before applying finishes. Minimum application temperatures for latex paints for interior work is 45 degrees F and 50 degrees F for exterior work. Minimum application temperature for varnish and stain finishes is 65 degrees F.
- E. Provide adequate continuous ventilation and sufficient heating facilities to maintain temperatures above 45 degrees F for 24 hours before, during and 48 hours after application of finishes.
- F. Provide minimum 80 foot candles of lighting on surfaces to be finished. No exceptions

3.2 PREPARATION

- A. Remove electrical plates, hardware, light fixture trim, and fittings prior to preparing for finishing.
- B. Correct defects, patch and fill substrate cracks, dents, holes, and other surface inconsistencies to match adjacent surfaces. Clean surfaces which affect work of this Section.
- C. Shellac and seal marks which may bleed through surface finishes.
- D. Impervious Surfaces: Remove mildew by scrubbing with solution of tri-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
- E. Concrete Floors: Schedule to receive clear sealer and wear surface, remove contamination, prepare according to wear surface manufacturer's instructions. Verify required acid-alkali balance is achieved. Allow to dry.
- F. Gypsum Board Surfaces: Latex fill minor defects. Spot prime defects after repair.
- G. Galvanized Surfaces: Remove surface contamination and oils and wash with solvent. Apply coat of etching primer.
- H. Shop Primed Steel Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Prime metal items including shop primed items.
- I. Steel Doors: Remove surface contamination and oils and wash with solvent. Seal top and bottom edges with primer.
- J. At all existing exterior caulked joints, remove all existing caulking, sealant, and backer materials. Cut, rout, and grind away all material in joints, clean and prepare for painting and re-sealing. After painting re-install sealant at all joint locations, in compliance with section 07 92 00.
- K. Existing wood rafters, joists, exposed wood clean existing dust, dirt, writing or stains off wood, prepare wood for finish per manufacturer's instructions.



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**3.3 APPLICATION**

- A. Apply products in accordance with manufacturer's instructions.
- B. Do not apply finishes to surfaces that are not dry.
- C. Apply each coat to uniform finish, without streaking, telegraphing of drywall joints or brush marks.
- D. Apply finish coats of paint slightly darker than preceding prime coat unless otherwise approved.
- E. Sand lightly between coats to achieve required finish.
- F. Allow applied coat to dry before next coat is applied.
- G. Back-roll all spray applied primer and finish coats on gypsum board or plaster finishes.
- H. Prime back surfaces of interior and exterior woodwork with primer paint.
- I. Seal concrete floors with specified sealer.
- J. Paint all roof top vents, to match similar color of existing roofing.
- K. Paint all Mechanical and Electrical Equipment exposed to public view, this shall include but not be limited to, ducts, conduits, fitting, suspension/anchors and boxes. Protect interior reflector surfaces of light fixtures from any paint application or overspray.
- L. Replace electrical plates, hardware, light fixture trim, and fittings removed prior to finishing.
- M. Field finish surfaces not factory pre-finished
- N. Protection
  - 1. Adequately protect other surfaces from paint and damage. Repair damage as a result of inadequate or unsuitable protection.
  - 2. Furnish sufficient drop cloths, shields and protective equipment to prevent spray or droppings from fouling surfaces not being painted and in particular, surfaces within storage and preparation area.
  - 3. Place cotton waste, cloths and materials which may constitute a fire hazard in closed metal containers and remove daily from site.
  - 4. Remove electrical plates, surface hardware, mechanical equipment, fittings and fastenings, prior to painting operations. These items are to be carefully stored, cleaned and replaced on completion of work in each area. Do not use solvent to clean hardware that may remove permanent lacquer finish.
- O. Mechanical and Electrical Equipment

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1. Refer to mechanical and electrical sections with respect to painting and finishing requirements, color coding, identification banding of equipment, ducting, piping and conduit.
2. Remove grilles, covers and access panels for mechanical and electrical systems from location, sand and paint separately.
3. Finish paint primed and existing field painted equipment to color selected.
4. Prime and paint insulated and bare pipes, conduits, boxes, insulated and bare ducts, hangers, brackets, collars and supports, except where items are plated or covered with a pre-finished coating.

**3.4 CLEANING**

- A. As Work proceeds, promptly remove paint where spilled, splashed, or spattered.
- B. During progress of Work maintain premises free of unnecessary accumulation of tools, equipment, surplus materials, and debris.
- C. Collect cotton waste, cloths, and material which may constitute a fire hazard, place in closed metal containers and remove daily from site.

**3.5 PROTECTION**

- A. Protect elements surrounding the work of this Section from damage or disfiguration.
- B. Repair damage to other surfaces caused by work of this Section.
- C. Furnish drop cloths, shields, and protective methods to prevent spray or droppings from disfiguring other surfaces.
- D. Remove empty paint containers from site.

**3.9 SCHEDULES**

- A. Shop-Primed Items for Site Finishing.
  1. Standard steel doors and frames (Division 08): All exposed surfaces, tops and bottoms of doors.
- B. Exterior Surfaces
  1. Pavement Markings: All striping and signage shall be in accordance with the WSDOT Standard Specifications and the latest Manual on Uniform Traffic Control Devices (MUTCD):
    - a. Two coat chlorinated rubber paint.
    - b. Standard color shall be white.
    - c. Handicapped symbols shall be painted standard blue.
    - d. No parking fire zone shall be painted yellow.

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C. Interior Surfaces

1. Steel - Primed:
  - a. Touch-up with original primer.
  - b. Paint Finish - One coat acrylic primer. 1.5 mil min.
  - c. Paint Finish - Two coats Alkyd (Pro Mar 200) semi-gloss finish. 3 mil min
2. Gypsum Board at toilet rooms and wet areas:
  - a. Sponge raw drywall tape joints and then apply one coat acrylic latex primer sealer with a vapor transmission rating less than one per TTP-1975 specifications, apply before final gypsum board texture coat.
  - b. One coat acrylic latex primer sealer with a vapor transmission rating less than one per TTP-1975 specifications, apply after final gypsum board texture coat.
  - c. Two coats epoxy enamel, semi-gloss sheen 3.0 mil.

D Colors – Interior color to be confirmed by paint draw down samples

1. Interior doors & frames: basis of design Sherwin Williams: Agreeable Gray SW7029
2. Interior walls: basis of design Sherwin Williams Alabaster SW 7008

END OF SECTION 099100

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SECTION 101400 – SIGNAGE & GRAPHICS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
  - 1. Panel signs and sign assemblies
    - a. Code required room identification exterior sign

1.2 DEFINITIONS

- A. ADA-ABA Accessibility Guidelines: U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines."

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show fabrication and installation details for signs.
  - 1. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
  - 2. Provide message list, typestyles, graphic elements including tactile characters and Braille, and layout for each sign.
- C. Qualification Data: For fabricator.
- D. Maintenance Data: For signs to include in maintenance manuals.
- E. Warranty: Special warranty specified in this Section.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: An employer of workers trained and approved by manufacturer.
- B. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.
- C. Regulatory Requirements: Comply with applicable provisions in ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.
  - 1. All disabled accessibility symbols shall be white on a blue background.

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1.5 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit installation of signs in exterior locations to be performed according to manufacturers' written instructions and warranty requirements.
- B. Field Measurements: Verify recess openings by field measurements before fabrication and indicate measurements on Shop Drawings.

1.6 COORDINATION

- A. Coordinate placement of anchorage devices with templates for installing signs.

1.7 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Deterioration of metal and polymer finishes beyond normal weathering.
    - b. Deterioration of embedded graphic image colors and sign lamination.
  - 2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Acrylic Sheet: ASTM D 4802, Category A-1 (cell-cast sheet), Type UVA (UV absorbing).

2.2 PANEL SIGNS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide signage system as manufactured by:
  - 1. Standard Room Identification Signs: Best; sign type as defined in sub-section "B" below:
  - 2. Subject to substitution request as provided in Division 01, alternate suppliers for these sign types are:
    - a. Advance Corporation; Braille-Tac Division.
    - b. Allen Industries Architectural Signage
    - c. APCO Graphics, Inc.
    - d. ASI-Modulex, Inc.
    - e. Best Sign Systems Inc.
    - f. Fossil Industries, Inc.
    - g. Gemini Incorporated.
    - h. Grimco, Inc.
    - i. InPro Corporation
    - j. Mohawk Sign Systems.
    - k. Nelson-Harkins Industries.

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- l. Seton Identification Products.
  - m. Signature Signs, Incorporated.
  - n. Meyer Sign Co.
- B. Panel Signs: Provide smooth sign panel surfaces constructed to remain flat under installed conditions within a tolerance of plus or minus 1/16 inch measured diagonally from corner to corner, complying with the following requirements:
1. Acrylic Sheet: 1/32 inch thick.
  2. Laminated Sheet: 1/8 inch phenolic with contrasting color laminated to acrylic face as selected by Architect from manufacturer's full range.
  3. Provide complete with 1" tall by width of the sign clear "window" insert slot (where noted)
  4. Edge Condition: Square cut.
  5. Corner Condition: Rounded to radius indicated.
  6. Mounting: Unframed.
    - a. Wall mounted with exposed stainless steel anchors
    - b. Manufacturer's standard anchors for substrates encountered.
    - c. Reference interior detail sheets for additional mounting requirements.
  7. Tactile Characters: Characters and Grade 2 Braille raised 1/32 inch above surface with contrasting colors.
- C. Tactile and Braille Sign: Manufacturer's standard process for producing text and symbols complying with ADA-ABA Accessibility Guidelines and with ICC/ANSI A117.1. Text shall be accompanied by Grade 2 Braille. Produce precisely formed characters with square-cut edges free from burrs and cut marks; Braille dots with domed or rounded shape.
1. Panel Material: Opaque acrylic sheet.
  2. Raised-Copy Thickness: Not less than 1/32 inch.
- 2.3 DIMENSIONAL CHARACTERS
- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Advance Corporation; Braille-Tac Division.
  2. A. R. K. Ramos.
  3. ASI-Modulex, Inc.
  4. Bunting Graphics, Inc.
  5. Gemini Incorporated.
  6. Grimco, Inc.
  7. Metal Arts; Div. of L&H Mfg. Co.
  8. Mills Manufacturing Company.
  9. Mohawk Sign Systems.
  10. Nelson-Harkins Industries.
  11. Signature Signs, Incorporated.
  12. Southwell Company (The).
- B. Cutout Characters: Provide characters with square-cut, smooth edges free from abrasive elements.
1. Character Material: Aluminum

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2. Letter Thickness: 3/8" Thick plate
3. Height: Varies – 36" tall letters.
4. Typestyle: Reference Drawings – Arial Font.
5. Graphics: Reference Exterior Elevations.
6. Color: Provide full range of color options to choose from.
7. Mounting: CMU/masonry, with rust-proof, stand-off hardware.

2.4 ACCESSORIES

- A. Anchors and Inserts: Provide nonferrous-metal or hot-dip galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance. Use toothed steel or lead expansion-bolt devices for drilled-in-place anchors. Furnish inserts, as required, to be set into concrete or masonry work.

2.5 FABRICATION

- A. General: Provide manufacturer's standard signs of configurations indicated.
  1. Mill joints to tight, hairline fit. Form joints exposed to weather to exclude water penetration.
  2. Preassemble signs in the shop to greatest extent possible. Disassemble signs only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation, in location not exposed to view after final assembly.
  3. Conceal fasteners if possible; otherwise, locate fasteners where they will be inconspicuous.

2.6 FINISHES, GENERAL

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.7 ACRYLIC SHEET FINISHES

- A. Colored Coatings for Acrylic Sheet: For copy and background and frame colors, provide colored coatings, including inks, dyes, and paints, that are recommended by acrylic manufacturers for optimum adherence to acrylic surface and that are UV and water resistant for five years for application intended.

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**PART 3 - EXECUTION**

**3.1 EXAMINATION**

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
- B. Verify that items, including anchor inserts are sized and located to accommodate signs.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

**3.2 INSTALLATION**

- A. Locate signs and accessories where indicated, using mounting methods of types described and complying with manufacturer's written instructions.
  - 1. Install signs level, plumb, and at heights indicated, with sign surfaces free of distortion and other defects in appearance.
  - 2. Wall Signs: Install signs on walls adjacent to latch side of door where applicable. Where not indicated or possible, such as double doors, install signs on nearest adjacent walls. Locate to allow approach within 3 inches of sign without encountering protruding objects or standing within swing of door.
- B. Wall-Mounted Signs: Comply with sign manufacturer's written instructions except where more stringent requirements apply.
  - 1. Mechanical Fasteners: Use nonremovable mechanical fasteners placed through predrilled holes. Attach signs with fasteners and anchors suitable for secure attachment to substrate as recommended in writing by sign manufacturer.

**3.3 CLEANING AND PROTECTION**

- A. After installation, clean soiled sign surfaces according to manufacturer's written instructions. Protect signs from damage until acceptance by Owner.

END OF SECTION 101400



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SECTION 102800 - TOILET AND BATH ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Washroom accessories.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated. Include the following:

1. Construction details and dimensions.
2. Anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
3. Material and finish descriptions.
4. Features that will be included for Project.
5. Manufacturer's warranty.

B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.

1. Identify locations using room designations indicated on Drawings.
2. Identify products using designations indicated on Drawings.

C. Maintenance Data: For toilet and bath accessories to include in maintenance manuals.

1.3 QUALITY ASSURANCE

A. Source Limitations: For products listed together in the same articles in Part 2, provide products of same manufacturer unless otherwise approved by Architect.

1.4 COORDINATION

A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.

B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

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1.5 WARRANTY

- A. Special Mirror Warranty: Manufacturer's standard form in which manufacturer agrees to replace mirrors that develop visible silver spoilage defects and that fail in materials or workmanship within specified warranty period.

1. Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Stainless Steel: ASTM A 666, Type 304, 0.0312-inch minimum nominal thickness, unless otherwise indicated.
- B. Steel Sheet: ASTM A 1008/A 1008M, Designation CS (cold rolled, commercial steel), 0.0359-inch minimum nominal thickness.
- C. Galvanized Steel Sheet: ASTM A 653/A 653M, with G60 hot-dip zinc coating.
- D. Galvanized Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.
- E. Fasteners: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant where exposed, and of galvanized steel where concealed.
- F. Chrome Plating: ASTM B 456, Service Condition Number SC 2 (moderate service).
- G. Mirrors: ASTM C 1503, Mirror Glazing Quality, clear-glass mirrors, nominal 6.0 mm thick.
- H. ABS Plastic: Acrylonitrile-butadiene-styrene resin formulation.

2.2 WASHROOM ACCESSORIES

- A. Provide washroom accessories as specified below, and as shown on the drawings. Not all accessories are shown in the drawings, the work consists of the items and installations defined below. Verify final locations with Owner and Architect prior to installation.
- B. Basis-of-Design Product: The design for accessories is based on products indicated. Subject to compliance with requirements, provide the named product or a comparable product by one of the following:
1. Bobrick Washroom Equipment, Inc.
  2. Bradley Corporation.
  3. Or approved substitution in accordance with Division 01 requirements
  4. Gamco Accessories
- C. Toilet Tissue (Roll) Dispenser:

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1. Baywest 80300 OptiCore Tissue Dispenser – Silhouette Revolution
2. Mounting: Surface mounted, contractor shall coordinate and provide adequate wall backing for installation, install at water closet location.

D. Soap Dispenser:

1. Waxie 383102 Wall Mount Dispenser
2. Mounting: Surface mounted, contractor shall coordinate and provide adequate wall backing for installation, install at each lavatory location
3. Locations include, as noted in the drawings:
  - a. Restroom hand wash sink locations

E. Grab Bar:

1. Basis-of-Design Product: Bobrick No. B-5806x36, 5806x48, and B-5806x24 at new disabled accessible water closet locations.
2. Mounting: Surface mounted, contractor shall coordinate and provide adequate wall backing for installation.

F. Sanitary-Napkin Disposal Units:

1. Basis-of-Design Product: Bobrick No. B-370 at new water closet location.
2. Mounting: Surface mounted, contractor shall coordinate and provide adequate wall backing for installation, install at each water closet location in female and uni-sex restrooms.
3. Provide one at each water closet.

G. Mirror Unit:

1. Basis-of-Design Product: Bobrick B-290 with tempered glass, width indicated in drawings by 48” tall. Include integral shelf.
2. Mounting: Surface mounted, contractor shall coordinate and provide adequate wall backing for installation
3. Location as indicated in the drawings

H. Robe Hook:

1. Basis-of-Design Product: Bobrick B-672,
  - a. Provide one on inside face of door at restroom.
2. Mounting: Surface mounted, contractor shall coordinate and provide adequate wall backing for installation. Mount at 54” above finish floor.

I. Hand Dryers

1. Basis-of-Design Product: World Dryer, SLIMdri, or World Dryer RA54-Q974
  - a. Provide one at new restroom.
2. Mounting: Surface mounted, contractor shall coordinate and provide adequate wall backing for installation. Mount at 54” above finish floor, or as indicated in the drawings.

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2.3 FABRICATION

- A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.
- B. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of equipment.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. Coordinate details with other work supporting, adjoining, or otherwise contacting items as required to ensure proper installation.
- D. Verify that surfaces and above ceiling supports/backing are installed by the general contractor and are ready to receive work.
- E. Verify exposed finishes have been applied, and setting conditions are dry, clean, and otherwise proper for installation

3.2 PREPARATION

- A. Coordinate size and location of equipment indicated to be attached to or recessed into the building construction, and furnish anchoring devices with templates, diagrams, and instructions for their installation.

3.3 INSTALLATION

- A. General: Install equipment, as required for a complete installation.
- B. Follow all manufacturer's recommendations and requirements for installation of the equipment.
- C. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.
- D. Grab Bars: Install to withstand a downward load of at least 250 lbf, when tested according to method in ASTM F 446.

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3.4 ADJUSTING AND CLEANING

- A. Provide systems demonstration under provisions of Division 01. Demonstrate equipment operation.
- B. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.
- C. Remove temporary labels and protective coatings.
- D. Clean and polish exposed surfaces according to manufacturer's written recommendations.

END OF SECTION 102800

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SECTION 220000 - PLUMBING GENERAL PROVISIONS

PART 1 - GENERAL

1.1 CONDITIONS AND REQUIREMENTS

- A. Refer to BIDDING REQUIREMENTS, CONDITIONS OF THE CONTRACT, and DIVISION 01 of these specifications, which govern work under DIVISION 22. Refer to other sections of these specifications for additional related requirements
- B. Codes, Permits and Fees
  - 1. Plumbing work shall be in accordance with the most recent publication of the following:
    - a. International Building Code
    - b. International Mechanical Code
    - c. Uniform Plumbing Code
    - d. International Fire Code
    - e. National Electric Code
    - f. American Disability Act
    - g. State and Local Codes and Ordinances.
  - 2. The Contractor at his expense shall obtain permits and inspections required for the mechanical work on this project. Deliver all inspection certificates to the Owner's Representative prior to final acceptance of the work.
  - 3. Contractor shall pay all costs levied by utility companies and/or governing agencies associated with water, sanitary and storm sewer connections and include these costs within his bid. This shall include but not be limited to tap fees, service mains, meters and vault charges.

1.2 DESCRIPTION OF WORK

- A. The work covered by the contract documents (specifications and construction drawings), shall include but not be limited to:
  - 1. Furnishing all materials and supplying all labor, equipment and services to install the complete plumbing system as shown in the contract documents.
  - 2. All products and materials installed on the project shall be new and in first class condition. Used or resold materials will not be allowed. If requested to verify authenticity of materials the Contractor shall be prepared to produce bill-of-sale invoices.
- B. This project has been designed to meet or exceed the minimum requirements of the governing Codes. The Contractor must notify the Owner's Representative in writing of any items in conflict with the Codes prior to signing his contract, or he shall thereafter make any minor adjustments necessary to meet the Codes at no cost to the Owner.

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- C. The Contractor shall comply with the project close-out requirements as detailed in Division 01, "Closeout Procedures."
- D. Safety Measures:
  - 1. The Contractor shall be solely and completely responsible for conditions of the job site, including safety of all persons and property during performance of the work. This requirement applies continuously and is not limited to normal working hours.
  - 2. Provide all required safety measures and consult with the State or Federal safety inspector for interpretation whenever in doubt as to whether safe conditions do or do not exist.
  - 3. Head protection: Where pipe hangers, equipment support angles, etc., are exposed in access ways for any maintenance, cover all such potentially injurious protrusions less than 7'-0" above the floor with padding; secure and permanently fasten, and finish to match adjacent finishes.

1.3 REFERENCES

A. Definitions

- 1. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.
- 2. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.
- 3. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.
- 4. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in duct shafts.
- 5. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

1.4 QUALITY ASSURANCE

- A. Materials used under this Contract, unless specifically noted otherwise, shall be new and of the latest and most current model line produced by the manufacturer. Each item of equipment shall conform to the latest applicable standards and codes.
- B. Motor and equipment name plates as well as applicable UL and AGA labels shall be in place when the Project is turned over to the Owner.
- C. All electrically driven or connected equipment shall be provided with UL or equivalent label and/or listing in accordance with the requirements of the NEC.
- D. Equipment shall be listed as an assembly where listing/labeling program is available for that type of equipment.

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- E. All control panels shall be provided with UL or equivalent Label and/or listing in accordance with the requirements of the NEC and applicable local codes.
- F. Fuel fired equipment shall be listed by a nationally recognized testing laboratory for use with the particular fuel type.
- G. All pressure vessels and relief valves shall be furnished in accordance with applicable State Boiler and Unfired Pressure Vessel Laws.
- H. Drawings:
  - 1. All required pipe offsets are not indicated on the drawings.
  - 2. Architectural and structural drawings take precedence over mechanical drawings if any dimensional discrepancies exist.
  - 3. Scaled and figured dimensions are approximate and are for estimating purposes only.
  - 4. The plans are diagrammatic and show generally the locations of the fixtures, equipment, and pipe. Drawings are not to be scaled, all dimensions shall be checked at the building. Before proceeding with work check and verify all dimensions.
  - 5. Assume all responsibility for fitting of materials and equipment to other parts of equipment and structure.
  - 6. Make adjustments that may be necessary or requested in order to resolve space problems, preserve headroom, and avoid architectural openings, structural members and work of other trades.
  - 7. Mechanical drawings show general arrangement of piping, ductwork, equipment, etc. Follow as closely as actual building construction and work of other trades will permit.
- I. Record Drawings / As-Builts: Refer to Division 01 requirements for closeout submittals.
  - 1. Keep on site, an extra set of drawings and specifications recording changes / as-builts and deviations daily. Return these drawings to the Owner's Representative at the completion of the Project. These drawings shall not be used for any other purposes.

**1.5 COORDINATION**

- A. Consider architectural and structural drawings part of this work insofar as these drawings furnish information relating to design and construction of the building and shall take precedence over mechanical drawings if any dimensional discrepancies exist.
- B. The Contractor shall refer to the architectural and structural details, plans, elevations, and other Contract Drawings and shall coordinate his work with that of the other trades to avoid interference.
- C. Piping Coordination:
  - 1. Prior to installation of the new systems, the Contractor shall coordinate the proposed installation with the Architectural and Structural requirements, and all other trades (including HVAC, Plumbing, Fire Protection, Electrical, Ceiling Suspension and Tile systems), and provide reasonable maintenance access requirements.
  - 2. Provide means of access to all valves, dampers, controllers, operable devices and other apparatus which may require adjustment or servicing.



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3. Verify in field exact size, location, invert, and clearances regarding all existing material, equipment and apparatus, and advise the Owners Representative of any discrepancies between that indicated on the Drawings and that existing in the field prior to any installation. Contractor shall be responsible for all costs associated with the removal or relocation of installed systems that have been installed without prior notification of the Owners Representative.

1.6 SUBMITTALS

A. Plumbing Cost Breakdown:

1. The Contractor shall furnish the Owner's Representative an itemized breakdown of the mechanical construction cost within 30 days of notice to proceed. This breakdown shall be utilized for pay applications.
2. At a minimum, the cost breakdown shall be as follows:
  - a. Plumbing Material
  - b. Plumbing Labor
  - c. Insulation

B. Submittal Log: Contractor shall prepare a master submittal log tracking spreadsheet for all Division 22 items, to be filled in, updated and furnished with each submittal package. Submittal log shall indicate specification section and sub-paragraph of each item included in the submittal, along with a general description of the item/equipment, manufacturer name, date submitted and a column for returned date, A/E review action (i.e. approved, approved as noted, revise and resubmit or rejected) and re-submittal action required (if any).

C. Submittals:

1. Electronic Submittal Option: At the contractor's option, the product submittals may be furnished in electronic (Adobe PDF or Skire Unifier) format. If electronic files are furnished, they must be organized in a similar manner to hard copy binders, with electronic indexing (bookmarks) and/or portfolio format for individual PDF files for ease of organizing and navigating for A/E review and comment purposes. **SUBMITTALS NOT PROVIDED IN THIS FORMAT WILL BE REJECTED.**
2. Refer to Division 01 requirement for submittal procedures and general requirements. See individual Division 22 specification sections for specific submittal requirements.
3. Submittals shall be bound in a black 3-ring binder with the project name on the cover & spine. Binder containing resubmitted Product Data shall also include a "Re-submittal" label in bold letters on the cover and spine. Data within this binder shall be arranged as follows:
4. Provide index tabs for each specification section in the same order and using the same name as appears in the Specifications.
5. Data shall be black and white on 8 ½" x 11" or 11" x 17" single one-sided sheets suitable for copying. Diagrams and drawings larger than 11" x 17" shall be submitted in reproducible form (translucent bond paper).
6. Drawings and catalog data must be clean and neat copies. Fax material or other poor quality copies will not be acceptable.
7. Submittal shall include all materials specified in the project in one binder. If multiple binders are required, additional binders shall be numbered sequentially, and all binders shall be submitted at the same time. If material or equipment is not as specified or

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- submittal is not complete, it will be rejected. Only completed submittals including all applicable specification sections will be reviewed.
8. Re-submittals shall include all materials being resubmitted in one binder. If multiple binders are required, additional binders shall be numbered sequentially, and all binders shall be submitted at the same time. Only completed re-submittals including all applicable specification sections will be reviewed.
  9. Review comments shall not relieve Contractor from responsibility for deviations from Contract Documents or Basis-of-Design equipment performance, unless attention has been called to such deviations in writing at time of submission, nor shall they relieve this Contractor from responsibility for errors in items submitted.
  10. Shop Drawings:
    - a. Shop drawings, catalog information and material schedules shall be submitted for approval on all materials and equipment prior to ordering. This applies to all specified material and equipment in Division 22.
    - b. Shop drawings shall be reviewed, approved and stamped by Contractor prior to submitting to Owner's Representative for approval. Submittals without such approval will be returned without review.
    - c. Allow for sufficient time for developing shop drawings, processing and review time so that the installation will not be delayed.
    - d. Indicate manufacturer, trade name and model number. **HIGHLIGHT, ENCIRCLE OR OTHERWISE INDICATE ALL DEVIATIONS FROM THE SPECIFIED PRODUCTS OR BASIS-OR-DESIGN EQUIPMENT.** Include copies of applicable brochure or catalogue materials. Indicate sizes, types, model numbers, ratings and capacities being proposed. Only those items being used on the project shall be included in the submittal.
    - e. Where choices of options and accessories are available or specified, provide written description of what is to be furnished. If necessary, list page numbers where submitted items are described.
    - f. Include dimensional data for roughing in and installation and technical data sufficient to confirm that equipment meets requirements of drawings and specifications.
    - g. Include wiring, piping and service connection data, motor sizes complete with voltage ratings and schedules. Upon approval, copies of these diagrams shall be forwarded to pertinent contractors.

1.7 CLOSEOUT SUBMITTALS

- A. General: Submit documents to the Owner/Owners Representative for approval prior to the building being turned over to the Owner.
- B. Record Documents: Construction documents shall be updated to convey a record of the alterations to the original design. Such updates shall include updated mechanical, electrical and control drawings red-lined, or redrawn if specified, that show all changes to size, type and locations of components, equipment and assemblies.
- C. Mechanical Operating and Maintenance (O&M) Manuals
  1. Refer to Division 01 for additional Closeout Submittal and Operation and Maintenance Data requirements.

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2. Contents for the Mechanical O&M Manual are to include the following:
- a. Title Page: Project Name, Project Number, building name, Architect, Mechanical Engineer, Electrical Engineer and General Contractor.
  - b. Table of Contents: Complete listing of contents of this O&M Manual. Where multiple volumes are required, provide Master Table of Contents covering all Volumes and place in the front of each volume.
  - c. Part 1: Listing of all Contractors, subcontractors and suppliers/vendors for all tiers. Information to include: names, addresses, phone numbers, fax numbers and area of work. Also include a copy of the emergency service information required in Division 1.
  - d. Part 2: Copies of all signed general, mechanical and plumbing permits, and inspection reports.
  - e. Part 3: Copies of all manufacturer's warranty and guarantee forms, and any specified special guarantees, fully executed.
  - f. Part 4: Provide a separate sub divider for each applicable Section in Divisions 22 & 23. Tabs are to be identified by specification section title (i.e. Plumbing Fixtures) and not just specification section number (i.e. Section 224000). For every Section provide the following:
    - 1) Index listing materials and equipment used.
    - 2) List of suppliers with address, phone number and fax number.
    - 3) Catalog cuts, data sheets, engineering calculations, schedules, wiring diagrams and complete parts lists for all products and equipment incorporated into the Project. Literature shall be clearly marked to indicate each specific item. Include copies of approved submittal data as part of this information.
    - 4) Approved submittal drawings (Option to submit Product Data Submittals as separate Volume(s) if contents are large).
    - 5) Manufacturer's printed operating instructions for all equipment including:
      - a) Initial startup procedures and break-in routine.
      - b) Normal operating instructions.
      - c) Regulation, control, stopping and shutdown.
      - d) Troubleshooting and emergency instructions.
      - e) Seasonal operating instructions.
    - 6) Cleaning, lubrication and preventative maintenance instructions.
    - 7) Disassembly, repair and reassembly instructions, including alignment and adjustment instructions.
    - 8) Sequence of operation for each system.
  - g. Part 9: Testing, Adjusting and Balancing Report.
  - h. Part 10: Final Commissioning Report (Option to submit as separate Volume(s) if contents are large).
  - i. Part 11: Spare parts and maintenance materials list. Provide summarized list of spare parts that are to be furnished to the Owner.
  - j. Part 12: Owner training sign-off sheets. Notebook sleeves with DVD;s of training.

1.8 MAINTENANCE MATERIAL SUBMITTALS:

- A. Spare Parts and Maintenance

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1. Provide summarized list of spare parts that are to be furnished. Incorporate into O&M Manual.
2. Refer to individual specification sections for spare parts to be furnished under this contract.
3. Operate, drain and flush bearings and refill with change of lubricant before final acceptance.
4. Protect bearings and shafts during installation. Grease shafts and sheaves to prevent corrosion. Provide extended nipples for lubrication.
5. Ensure that existing equipment is carefully dismantled and not damaged or lost. Do not re-use existing materials and equipment unless specifically indicated.

1.9 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. See Division 01, Section “Product Requirements,” for additional requirements.
- B. Follow manufacturer’s directions in delivery, storage, protection, and installation of equipment and materials.
- C. Promptly notify Owner’s Representative in writing of conflicts between requirements of Contract Documents and Manufacturer’s directions and obtain written instructions from Owner’s Representative before proceeding with work. Contractor shall bear expenses of correcting deficiencies of work that does not comply with manufacturer’s directions or such written instructions from Owner’s Representative.
- D. Deliver equipment and material to site and tightly cover and protect against dirt, water, and chemical or mechanical injury but have readily accessible for inspection. Store items subject to moisture damage in a dry, heated space.
- E. Special Storage Requirements:
  1. Equipment and products to be stored on the project site either outside or inside but unheated spaces, shall be provided with shrink-wrapped coverings and shall be additionally provided with chemical dessicant packs to control any stray moisture that may enter the protective wrapping.
- F. Notify Owner of equipment delivery dates, 24 hours in advance of delivery.
- G. Equipment Protection:
  1. The Contractor shall be responsible for protection of equipment furnished in this Division from vandalism and weather during all phases of construction. Damaged equipment shall be restored to like new condition or replaced at the Contractor’s expense.
  2. Protect equipment and materials in storage on site, during and after installation until final acceptance. Leave factory covers in place and take special precautions to prevent entry of foreign material into working parts of piping and duct systems.
- H. Any factory painted equipment scratched or marred during shipment or construction shall be restored to original “new” condition. This includes complete repainting if necessary to provide exact paint match.

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1.10 FIELD CONDITIONS

A. Existing Utilities and Piping:

1. The locations of existing concealed lines and connection points have been indicated as closely as possible from available information. The Contractor shall assume that such connection points are within a Ten foot (10') radius of the indicated location. Where connection points are not within this radius, the Contractor shall contact the Owner's Representative for a decision before proceeding or may proceed at his own expense.
2. Connection points to existing work shall be located and verified prior to starting new work.
3. Prior to commencing any excavation or ditching activity, the Contractor shall verify the exact location and inverts of all existing utilities and connection points in the area of his proposed excavation. Notify Owner's representative for further direction if actual inverts will not allow the proper installation of new work.
4. The Contractor shall be responsible for damages, which might be caused by his failure to exactly locate and preserve underground utilities.

1.11 WARRANTY

- A. The Plumbing equipment and installation shall be warranted for a period of one (1) year from the date of building acceptance unless an individual item or specification is otherwise noted as longer. The Contractor shall make-good at his own expense all defects in his work, and/or equipment furnished by him, which shall develop at any time during the one year guarantee period and shall bear any expense of cutting, patching and repairing made necessary by his corrections of unsatisfactory work or equipment operation.
- B. Provide specific equipment/material warranties that extend beyond 1 project warranty period. Refer to individual specification sections for required extended warranties. See Division 01 Section "Closeout Submittals."

PART 2 – PRODUCTS

2.1 SUBSTITUTIONS

- A. Refer to Division 01 requirements for product prior approval and substitution requirements.
- B. Throughout these specifications and drawings, various materials, equipment, apparatus, etc., are specified or scheduled by manufacturer, brand name, type or catalog number. Such designation is to establish standards of desired quality and construction and shall be the basis of design and the bid.
- C. Equipment manufacturers listed in individual sections are approved alternatives for this project and are subject to requirements of drawings and specifications. Revisions required to adapt alternatives shall be the responsibility of the Contractor.

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- D. Where two or more manufacturer designations are listed in these specifications, choice will be optional with the Contractor.
  - 1. Exception: Where more than one manufacturer is listed, and only one manufacturer's catalog number is specified or only one manufacturer is scheduled on the drawings (basis of design), that standard of quality, dimensional characteristics, capacities, and construction shall be maintained by materials or equipment supplied by the other manufacture(s).
- E. If the Contractor uses manufactures other than the basis of design, the Contractor shall be responsible for:
  - 1. Insuring the substituted item will fit in the available space while allowing proper maintenance access. In the event other than specified equipment is used and will not fit job site conditions, this Contractor assumes responsibility for replacement with items indicated as the basis of design.
  - 2. Any changes required by other Contractors caused by the substituted equipment.
  - 3. Changes in structural design due to weight differences.
- F. Products furnished other than the basis of design shall have similar electrical characteristics as the scheduled or specified equipment. Contractor shall be responsible for any electrical changes caused by products not in accordance with this requirement.
- G. Substitutions will not be permitted without written approval.

**PART 3 – EXECUTION**

**3.1 EXAMINATION**

- A. Examine premises and understand the condition which may affect performance of work of this Division before submitting proposals for this work.
- B. No subsequent allowance for time or money will be considered for any consequence related to failure to examine existing site conditions.

**3.2 INTERFACE WITH OTHER WORK – COORDINATION**

- A. Coordination of Division 22 equipment and systems to the available space, with other trades. The access routes through the construction shall be the Contractor's responsibility.
- B. Drawings are diagrammatic. Make offsets, transitions, and changes in direction of pipes and ducts, as required to maintain proper headroom and pitch of sloping lines and avoid structural, electrical, pipe and duct interference's whether or not indicated on Drawings. Furnish fittings, etc., as required to make these offsets, transitions and changes in direction at no additional cost to the Owner.

**3.3 INSTALLATION**

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A. Piping:

1. Determine exact route and location of each pipe and duct and coordinate and obtain approval for changes from the layout indicated on the drawings with the Owner's Representative prior to fabrication.
2. Locations of equipment and devices, as shown on the drawings, are approximate unless dimensioned. Verify the physical dimensions of each item of plumbing equipment to fit the available space and promptly notify the Owner's Representative prior to roughing-in if conflicts appear.
3. All piping, wiring, equipment, ductwork, tubing, etc., shall be concealed within building construction unless otherwise noted, or in mechanical rooms.
4. Arrange pipes, ducts, and equipment to permit ready access to valves, unions, traps, trap primers, starters, motors, control components, and to clear openings of doors and access panels.

B. Cutting and Patching

1. Perform all cutting and patching of new and existing construction required for the installation of systems and equipment specified in Division 22. It is the contractor's responsibility to determine location and amount of saw-cutting required, unless noted otherwise on the drawings. All cutting shall be accomplished with masonry saws, drills or similar equipment to provide neat uniform openings.
2. Patch and repair walls, floors, ceilings and roof with materials of same quality and appearance as adjacent surfaces unless otherwise shown. Surface finishes shall exactly match existing finishes of same materials. All patching shall meet the approval of the Owner's Representative.
3. All cutting and patching necessary to repair defective equipment, defective workmanship or neglect of this Contractor to properly anticipate his requirements shall be included.
4. Cut carefully to minimize necessity for repairs to existing work. Do not cut beams, columns, or trusses or other structural members without the Owner Representative's written approval.
5. Cutting, patching, repairing, and replacing pavement, sidewalks, roads, and curbs to permit installation of work specified or indicated under this Division is included.

3.4 TESTING

- A. Equipment Tests: Equipment shall be subject to tests as specified below. A record shall be kept to record each test and copies shall be sent to the Owner's Representative after each test is complete.
- B. Provide all test equipment, including test pumps, gauges, instruments, and other equipment required. Upon completion of testing, certify in writing that the specified tests have been performed and that the installation complies with the specified requirements.
- C. Demonstrate that the systems are performing to provide conditions through all possible modes of operation as outlined below. The verification testing procedures shall address all operating characteristics of all mechanical equipment and systems, including:
- D. Piping systems shall be subject to tests as specified below. No piping shall be covered or concealed until it has been tested, inspected and approved by the Owner's Representative, Mechanical Engineer and any local inspector having jurisdiction. Isolate systems during testing

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and flushing. Equipment items with maximum working pressure of less than the test pressure shall be removed or bypassed during test.

- E. Piping: Remove from the system during testing, all equipment which would be damaged by test pressure. Replace removed equipment when testing has been accomplished. The systems may be tested in sections as the work progresses; however, any previously tested portion shall become a part of any latter test of a composite system. Correct leaks by remaking joints with new material.
- F. A record similar to the following shall be kept to record each test and copies shall be sent to the Owner’s Representative, Mechanical Engineer after each test is complete.

SYSTEM TESTED	TESTED BY	INSPECTOR	OWNER REP.	DATE
All Domestic Water Piping	_____	_____	_____	_____
All Waste/Vent	_____	_____	_____	_____

- G. Test time will be accrued only while full test pressure in on the system, unless indicated otherwise. Tolerance shall be no pressure drop, except that due to temperature change in a 24-hour period. Inspect and test all work prior to burying or concealing.

System	Test Medium	Test Pressure	Tolerance	Test Period
All Domestic Water	Water	175 psig	None	8 Hours
All Waste	Water	10 feet head, 5 psi	No Leaks	8 Hours
All Vent	Water	10 feet headheat, 5 psi	No Leaks	8 Hours

- H. Valves: Test all valve bonnets for tightness. Operate all valves at least once from closed-to-open-to-closed position while valve is under test pressure. Test all automatic valves, including solenoid valves, and temperature and pressure relief valves, safety valves, and temperature and pressure relief valves not less than three (3) times.
- I. Piping Specialties: Test all thermometers, pressure gauges, and water meters for accurate indication; automatic water feeders, air vents, trap primers, and vacuum breakers for proper performance. Test all air vent points to ensure that all air has been vented.
- J. Backflow Preventers: Each testable backflow prevention device shall be tested and approved by certified testers after installation. Submit test results to owner representative and City of Dayton.

**3.5 SYSTEM CLEANING AND FLUSHING**

- A. The following piping systems shall be flushed, cleaned, disinfected, etc. by a recognized professional firm engaged in the business of pipe cleaning and water treatment after the completion of each construction phase. Work shall be accomplished in accordance with the following requirements. Work shall be fully documented by means of certificates stating work accomplished, methods used and date work was done. System cleaning and flushing shall be done by Inland Aqua Tech, King Total Systems, or approved equal.

- 1. Domestic Water (Inside Foundation Perimeter)



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- a. Disinfect water mains and water service piping, in accordance with AWWA C 601.
  - b. Domestic water lines shall be chlorinated by injecting chlorine at the entrance main (where new waterline connects to existing main outside the building) and maintaining 100 PPM concentration at every plumbing fixture for a 24-hour period. Flush until chlorine level is same as incoming water. Water samples shall be submitted and approved by the County health authority prior to acceptance and occupancy by the District. Approval by the District Representative is conditional on receipt of documentation. Note: water samples shall be taken at appropriate locations throughout the building to assure complete sampling of all domestic water systems.
  - c. Domestic water heater shall be chlorinated in the same manner as the domestic water piping, and maintaining 100 PPM concentration for a 24-hour period. Flush until chlorine level is same as incoming water. Water samples shall be submitted and approved by the County health authority prior to acceptance and occupancy by the District. Approval by the District Representative is conditional on receipt of documentation.
- B. Clean up all equipment, materials, cartons, and other debris that is a direct result of the installation of equipment under this contract.
  - C. Clean exposed piping, ductwork, equipment, and fixtures. Repair damaged finishes and leave everything in working order.
  - D. Remove stickers from fixtures and adjust flush valves.

3.6 PROJECT FINALIZATION & STARTUP

- A. Upon completion of the equipment and systems installation and connections, at the end of each Construction Phase, the Contractor shall assemble all major equipment factory representatives (Water Heaters, Plumbing Fixtures, Pumps) and subcontractors together for system start-up and Owner instructional period.
- B. These individuals shall assist in start-up and check out of their systems and shall remain at the site until the system operation is acceptable and understood to the Owner's maintenance and/or operation personnel.
- C. To provide acceptance of operation and instruction by the Owner's representative, the Contractor shall prepare a written statement of acceptance explaining same for the Owner's signature.
- D. The statement should read as follows:

"I, the Contractor, associated factory representative and subcontractor, have started each system and the total system and have proved their normal operation to the Owner's representative and have instructed him in the operation and maintenance thereof."

\_\_\_\_\_  
Owner's Representative

\_\_\_\_\_  
Contractor

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- E. Copies of this acceptance shall be sent to the Engineer and the Architect, and one copy shall be placed in each maintenance manual.

3.7 CLOSEOUT ACTIVITIES

A. Demonstration and Owner Training:

1. Instruct the designated Owners representative(s) in operation and maintenance of mechanical systems utilizing the information and material available in the Operation and Maintenance Manual.
2. Individuals present shall include Contractors, subcontractors and equipment factory representatives. These individuals shall assist in instruction and start-up.
3. Instruction period shall occur after final inspection when systems are properly working.
4. Prepare statement and check list to be included in the Operation and Maintenance Manual. This Statement shall read as follows:

“The Contractor, associated factory representatives and subcontractors, have started each system and the total system and have proved their normal operation to the Owner’s representative and have instructed him in the operation and maintenance thereof.”

\_\_\_\_\_  
Owner’s Representative

\_\_\_\_\_  
Contractor

B. Punch List Procedures

1. Refer to Division 01 Section “Closeout Procedures,” for general punch list procedures.
2. The project shall be fully cleaned and in all respects ready to turn over to the Owner for occupancy before the Punch List Inspection is requested. This shall include but not be limited to:
  - a. Cleaning up all equipment, materials, cartons, and other debris that is a direct result of the installation of equipment under this contract.
  - b. Cleaning exposed piping, equipment, and fixtures.
  - c. Repairing damaged finishes.
3. The Contractor shall notify the Owner’s Representative in writing when the project or phase is ready for punch lists. After punch lists are complete, written notice must be forwarded to the Owner’s Representative requesting final checkout.
4. At the time of final observation, the contractor shall accompany the observation party and shall remove access panels as required, to allow complete observation of the entire mechanical system.

END OF SECTION 220000

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SECTION 220500 - COMMON WORK RESULTS FOR PLUMBING

PART 1 – GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Piping materials and installation instructions common to most piping systems.
2. Dielectric fittings.
3. Sleeves.
4. Escutcheons.
5. Plumbing demolition.
6. Equipment installation requirements common to equipment sections.
7. Supports and anchorages.
8. Access doors.

1.2 DEFINITIONS

- A. Finished Spaces: Spaces other than plumbing and electrical equipment rooms, furred spaces, pipe chases, unheated spaces immediately below roof, space above ceilings, unexcavated spaces, crawlspaces, and tunnels.
- B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and plumbing equipment rooms.
- C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.
- D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in chases.
- E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

1.3 SUBMITTALS

- A. Welding certificates.

1.4 QUALITY ASSURANCE

- A. Electrical Characteristics for Plumbing Equipment: Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

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**PART 2 – PRODUCTS**

**2.1 PIPE, TUBE, AND FITTINGS**

- A. Refer to individual Division 22 piping Sections for pipe, tube, and fitting materials and joining methods.
- B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

**2.2 JOINING MATERIALS**

- A. Refer to individual Division 22 piping Sections for special joining materials not listed below.
- B. Pipe-Flange Gasket Materials: ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch maximum thickness unless thickness or specific material is indicated.
- C. Solder Filler Metals: ASTM B32, lead-free alloys. Include water-flushable flux according to ASTM B813.
- D. Brazing Filler Metals: AWS A5.8, BCuP-5 Series or BAg1, minimum 15% silver filling, unless otherwise indicated.
- E. Welding Filler Metals: Comply with AWS D10.12.

**2.3 DIELECTRIC FITTINGS**

- A. Description: Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.
- B. Insulating Material: Suitable for system fluid, pressure, and temperature.
- C. Dielectric Unions: Factory-fabricated, union assembly, for 250-psig minimum working pressure at 180 deg F.
- D. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150- or 300-psig minimum working pressure as required to suit system pressures.
- E. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300-psig minimum working pressure at 225 deg F.
- F. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig minimum working pressure at 225 deg F.

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2.4 SLEEVES

- A. Galvanized-Steel Sheet: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.
- B. Steel Pipe: ASTM A53, Type E, Grade B, Schedule 40, galvanized, plain ends.
- C. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.

2.5 ESCUTCHEONS

- A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.
- B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with polished chrome-plated finish.
- C. One-Piece, Cast-Brass Type: With set screw.
  - 1. Finish: Polished chrome-plated.

PART 3 – EXECUTION

3.1 PIPING SYSTEMS - COMMON REQUIREMENTS

- A. Install piping according to the following requirements and Division 22 Sections specifying piping systems.
- B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.
- C. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.
- D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
- F. Install piping to permit valve servicing.
- G. Install piping at indicated slopes.

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- H. Install piping free of sags and bends.
- I. Install fittings for changes in direction and branch connections.
- J. Install piping to allow application of insulation.
- K. Select system components with pressure rating equal to or greater than system operating pressure.
- L. Install escutcheons for penetrations of walls, ceilings, and floors.
- M. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.
- N. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. All required fire stopping required for Division 22 systems shall be provided and installed under this Section..
- O. Verify final equipment locations for roughing-in.
- P. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

3.2 PIPING JOINT CONSTRUCTION

- A. Join pipe and fittings according to the following requirements and Division 22 Sections specifying piping systems.
- B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- D. Soldered Joints: Apply ASTM B813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B32.
- E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using a filler containing 15% silver. Silver brazing shall be done by persons capable of obtaining "Medical Gas License" as determined by the State of Washington.
- F. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
  - 1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified. Care shall be taken to lessen the amount of thread compound and or tape introduced into the piping system during pipe fitting and joint construction.

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2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

G. Welded Joints: Construct joints according to AWS D10.12, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.

H. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

3.3 PIPING CONNECTIONS

A. Make connections according to the following, unless otherwise indicated:

1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.
3. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

3.4 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

A. Install equipment to allow maximum possible headroom unless specific mounting heights are not indicated.

B. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.

C. Install plumbing equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.

D. Install equipment to allow right of way for piping installed at required slope.

3.5 ERECTION OF METAL SUPPORTS AND ANCHORAGES

A. Refer to Division 05 Section "Metal Fabrications" for structural steel.

B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor plumbing materials and equipment.

C. Field Welding: Comply with AWS D1.1.

3.6 ERECTION OF WOOD SUPPORTS AND ANCHORAGES

A. Cut, fit, and place wood grounds, nailers, blocking, and anchorages to support, and anchor plumbing materials and equipment.

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- B. Select fastener sizes that will not penetrate members if opposite side will be exposed to view or will receive finish materials. Tighten connections between members. Install fasteners without splitting wood members.
- C. Attach to substrates as required to support applied loads.

3.7 ACCESS DOORS

- A. Access doors to match surrounding surface, provided with recess to accept matching finish. Provide UL rated doors in fire rated construction.
- B. Provide 12"x12" access doors for maintenance or adjustments purposes for all mechanical system components including valves, volume dampers, fire dampers, fire/smoke dampers, clean outs, traps and controls.

END OF SECTION 220500



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SECTION 220523 - GENERAL-DUTY VALVES FOR PLUMBING PIPING

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes:

1. Bronze ball valves.
2. Bronze butterfly valves.
3. Check Valves
4. Pressure Reducing Valves
5. Hot Water Recirculation Valves

B. Related Sections:

1. Division 22 plumbing piping Sections for specialty valves applicable to those Sections Only.
2. Section 22 05 53 - Identification for Plumbing Piping and Equipment for valve tags and schedules.

1.2 SUBMITTALS

- A. Product Data: For each type of valve indicated.

1.3 QUALITY ASSURANCE

- A. ASME Compliance: ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
- B. NSF Compliance: NSF 61 for valve materials for potable-water service.
- C. All General Duty Valves, associated fittings and trim shall comply with ANSI/NSF 61-8, Annex G and US Senate Bill S.3874 for the wetted surface of all potable water plumbing components as it relates to LEAD-FREE construction.

PART 2 – PRODUCTS

2.1 GENERAL REQUIREMENTS FOR VALVES

- A. Refer to valve schedule articles for applications of valves.
- B. Valve Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

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- C. Valve Sizes: Same as upstream piping unless otherwise indicated.
- D. Valve Actuator Types:
  - 1. Gear Actuator: For quarter-turn valves NPS 8 and larger.
  - 2. Handwheel: For valves other than quarter-turn types.
  - 3. Handlever: For quarter-turn valves NPS 6 and smaller except plug valves.
- E. Valves in Insulated Piping: With 2-inch stem extensions and the following features:
  - 1. Ball Valves: With extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.
  - 2. Butterfly Valves: With extended neck.
- F. Valve-End Connections:
  - 1. Flanged: With flanges according to ASME B16.1 for iron valves.
  - 2. Threaded: With threads according to ASME B1.20.1.

2.2 BRONZE BALL VALVES

- A. Two-Piece, Full-Port, Bronze Ball Valves with Bronze Trim:
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Crane Co.; Crane Valve Group; Crane Valves.
    - b. Crane Co.; Crane Valve Group; Jenkins Valves.
    - c. Grinnell.
    - d. Hammond Valve.
    - e. Milwaukee.
    - f. Mueller.
    - g. Nibco.
    - h. Stockham.
    - i. Watts.
    - j. Red White Valve
    - k. Apollo
  - 2. Description:
    - a. Standard: MSS SP-110.
    - b. SWP Rating: 150 psig.
    - c. CWP Rating: 600 psig WOG.
    - d. Body Design: Two piece.
    - e. Body Material: Bronze.
    - f. Ends: Threaded.
    - g. Seats: PTFE or TFE.
    - h. Stem: Stainless Steel.
    - i. Ball: Stainless Steel.
    - j. Port: Full.

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2.3 BUTTERFLY VALVES

A. Class 150:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Crane Co.; Crane Valve Group; Crane Valves.
  - b. Crane Co.; Crane Valve Group; Jenkins Valves.
  - c. Grinnell.
  - d. Hammond Valve.
  - e. Milwaukee.
  - f. Mueller.
  - g. Nibco.
  - h. Stockham.
  - i. Watts.
  - j. Red White Valve
  - k. Apollo
2. Description:
  - a. Standard: MSS SP-67.
  - b. CWP Rating: 200 psig.
  - c. Body Material: ASTM A126 CL B, Cast Iron.
  - d. Ends: Flanged.
  - e. Stem: Stainless.
  - f. Disc: Aluminum Bronze ASTM B148.
  - g. Liner: EPDM
  - h. Seal: EPDM
  - i. Operator: Lever Handle

2.4 CHECK VALVES

A. Class 125:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Crane Co.; Crane Valve Group; Crane Valves.
  - b. Crane Co.; Crane Valve Group; Jenkins Valves.
  - c. Grinnell.
  - d. Hammond Valve.
  - e. Milwaukee.
  - f. Mueller.
  - g. Nibco.
  - h. Stockham.
  - i. Watts.
  - j. Red White Valve
  - k. Apollo
2. Description:
  - a. Standard: MSS SP-80, ASTM B62 and ASTM B16 cast bronze body for 2" and smaller Screwed ends. Teflon Bronze Disc.
  - b. Standard: MSS SP-71, ASTM A126 class B cast iron body for 2-1/2" and Larger. Flanged ends. Cast Iron Disc.

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2.5 RELIEF VALVES

- A. Relief Valve: Watts vacuum relief valve, bronze body, silicone disc, threaded ends, installed on cold water supply line only, refer to Hot Water Heater Detail on drawings.
  - 1. Temperature and pressure Relief Valve: Watts, bronze body construction, thermostat and test lever, temperature relief set at 210 degrees F, and pressure relief set at 150 psig.

2.6 BACKFLOW PREVENTION VALVES

- A. Reduced Pressure Zone Backflow Preventer for High Hazard Applications:
  - 1. 2" and Smaller: Assembly shall consist of shutoff ball valves in inlet and outlet, and strainer on inlet. Assemblies shall include test cocks and pressure-differential relief valve located between two positive seating check valves and shall comply with requirements of ASSE Standard 1013 and AWWA C506. Bronze construction, threaded ends, stainless steel internal parts and air gap fitting. Route pipe from air gap fitting to approved waste receptor.
  - 2. 2-1/2" and Larger: Assembly shall consist of shutoff OS&Y gate valves in inlet and outlet with strainer on inlet. Assemblies shall include test cocks and pressure-differential relief valve located between two positive seating check valves and shall comply with requirements of ASSE Standard 1015 and AWWA C506. Epoxy coated cast iron body construction, flanged ends, stainless steel internal parts, bronze eats, and air gap fitting. Route pipe from air gap fitting to approved waste receptor.
- B. Double Check Valve for Low Hazard Applications:
  - 1. 2" and Smaller: Assembly shall consist of shutoff ball valves in inlet and outlet, and strainer on inlet. Assemblies shall include test cocks and two positive seating check valves and shall comply with requirements of ASSE Standard 1015 and AWWA C506. Bronze construction, threaded ends, and stainless-steel internal parts.
  - 2. 2-1/2" and Larger: Assembly shall consist of shutoff OS&Y gate valves in inlet and outlet with strainer on inlet. Assemblies shall include test cocks and two positive seating check valves and shall comply with requirements of ASSE Standard 1015 and AWWA C506. Epoxy coated cast iron body construction, flanged ends, stainless steel internal parts.
  - 3. Atmospheric Vacuum Breaker: Assembly shall consist of a bronze vacuum breaker body with silicone disc, and full-size orifice. Device shall be IAPMO listed, meet ASSE standard 1001, and ANSI standard A113.1.1. Chrome plated in finish areas.
  - 4. Pressure Vacuum Breaker: Assembly shall consist of a one-piece bronze or stainless-steel body, with stainless-steel spring-loaded check, rubber diaphragm, and atmospheric vent, breakaway set screw. Chrome plated in finish areas.

2.7 PRESSURE-REDUCING VALVES

- A. Provide as indicated on the drawings.

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- B. Point of use pressure reducing valves at equipment shall be single seated, direct operated type; high capacity, having bronze body with strainer, by-pass feature, pressure gauge tapping and complying with the requirements of ASSE Standard 1003 for.
- C. Domestic water service pressure reducing valves shall be hydraulically operated and pilot controlled. Valve shall contain integral low flow by-pass PRV for low conditions.

2.8 HOT WATER RECIRCULATION BALANCING VALVES

A. Pressure Independent Balancing Valves:

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Delta
  - b. Hays
  - c. Griswold Controls.
- 2. Body: Brass or ferrous metal.
- 3. Piston and Spring Assembly: Stainless steel, tamper proof, self cleaning, and removable.
- 4. Combination Assemblies: Include bronze or brass-alloy ball valve.
- 5. Identification Tag: Marked with zone identification, valve number, and flow rate.
- 6. Size: Same as pipe in which installed.
- 7. Performance: Maintain constant flow, plus or minus 5 percent over system pressure fluctuations.
- 8. Minimum CWP Rating: 175 psig.
- 9. Maximum Operating Temperature: 250 deg F.

B. Pressure Dependent, Bronze, Balancing Valves:

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Armstrong Pumps, Inc.
  - b. Bell & Gossett Domestic Pump; a division of ITT Industries.
  - c. Flow Design Inc.
  - d. Gerand Engineering Co.
  - e. Griswold Controls.
  - f. Taco.
  - g. Tour & Andersson; available through Victaulic Company of America
  - h. Hays.
- 2. Body: Bronze, ball or plug type with calibrated orifice or venturi.
- 3. Ball: Brass or stainless steel.
- 4. Plug: Resin.
- 5. Seat: PTFE.
- 6. End Connections: Threaded
- 7. Pressure Gage Connections: Integral seals for portable differential pressure meter.
- 8. Handle Style: Lever, with memory stop to retain set position.
- 9. CWP Rating: Minimum 125 psig.
- 10. Maximum Operating Temperature: 250 deg F.

C. Pressure Dependent, Cast-Iron or Steel, Balancing Valves:

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1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Armstrong Pumps, Inc.
  - b. Bell & Gossett Domestic Pump; a division of ITT Industries.
  - c. Flow Design Inc.
  - d. Gerand Engineering Co.
  - e. Griswold Controls.
  - f. Taco.
  - g. Hays.
2. Body: Cast-iron or steel body, ball, plug, or globe pattern with calibrated orifice or venturi.
3. Ball: Brass or stainless steel.
4. Stem Seals: EPDM O-rings.
5. Disc: Glass and carbon-filled PTFE.
6. Seat: PTFE.
7. End Connections: Flanged or grooved.
8. Pressure Gage Connections: Integral seals for portable differential pressure meter.
9. Handle Style: Lever, with memory stop to retain set position.
10. CWP Rating: Minimum 125 psig.
11. Maximum Operating Temperature: 250 deg F.

**PART 3 – EXECUTION**

**3.1 VALVE INSTALLATION**

- A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.
- B. Locate valves for easy access and provide separate support where necessary.
- C. Install valves in horizontal piping with stem at or above center of pipe.
- D. Install valves in position to allow full stem movement.
- E. Install swing check valves for proper direction of flow and in horizontal position with hinge pin level.

**3.2 ADJUSTING**

- A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

**3.3 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS**

- A. If valve applications are not indicated, use the following:
  1. Shutoff Service: Ball or butterfly valves.
  2. Throttling Service: ball valves.

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- 3. Balancing: Calibrated
- B. If valves with specified SWP classes or CWP ratings are not available, the same types of valves with higher SWP class or CWP ratings may be substituted.
- C. Select valves, except wafer types, with the following end connections:
  - 1. For Copper Tubing, NPS 2 and Smaller: Threaded ends.
  - 2. For Copper Tubing, NPS 2 1/2 and Larger: Threaded or flanged ends.
  
- 3.4 DOMESTIC, HOT, COLD AND TEMPERED WATER VALVE SCHEDULE
  - A. Pipe NPS 2 and Smaller:
    - 1. Bronze Ball Valves: Provide with threaded ends.
  - B. Pipe NPS 2 1/2 and Larger:
    - 1. Cast Iron Butterfly Valves: Provide with threaded or flanged ends.
  
- 3.5 NON-POTABLE, HOT- AND COLD-WATER VALVE SCHEDULE
  - A. Pipe NPS 2 and Smaller:
    - 1. Bronze Ball Valves: Provide with threaded ends.
  - B. Pipe NPS 2 1/2 and Larger:
    - 1. Cast Iron Butterfly Valves: Provide with threaded or flanged ends.
  
- 3.6 DOMESTIC, NON-POTABLE AND TEMPERED HOT WATER RECIRCULATION SYSTEM
  - A. Balance complete domestic hot water system per Section 23 05 93 – Testing, Adjusting and Balancing.

END OF SECTION 220523

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SECTION 220529 - HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 – GENERAL

1.1 SUMMARY

- A. This Section includes the following:
  - 1. Steel pipe hangers and supports.
  - 2. Trapeze pipe hangers.
  - 3. Metal framing systems.
  - 4. Thermal-hanger shield inserts.
  - 5. Fastener systems.
  - 6. Equipment supports.
- B. See Division 05 Section “Metal Fabrications” for structural-steel shapes and plates for trapeze hangers for pipe and equipment supports.

1.2 DEFINITIONS

- A. Terminology: As defined in MSS SP-90, "Guidelines on Terminology for Pipe Hangers and Supports."

1.3 PERFORMANCE REQUIREMENTS

- A. Design supports for multiple pipes capable of supporting combined weight of supported systems, system contents, and test water.
- B. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

1.4 SUBMITTALS

- A. Product Data: For the following:
  - 1. Steel pipe hangers and supports.
  - 2. Thermal-hanger shield inserts.
- B. Shop Drawings: Show fabrication and installation details and include calculations for the following:
  - 1. Trapeze pipe hangers. Include Product Data for components.
  - 2. Metal framing systems. Include Product Data for components.
  - 3. Equipment supports.
- C. Welding certificates.



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1.5 QUALITY ASSURANCE

- A. Welding: Qualify procedures and personnel according to ASME Boiler and Pressure Vessel Code: Section IX.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 STEEL PIPE HANGERS AND SUPPORTS

- A. Description: MSS SP-58, Types 1 through 58, factory-fabricated components. Refer to Part 3 "Hanger and Support Applications" Article for where to use specific hanger and support types.
- B. Manufacturers:
  - 1. B-Line Systems, Inc.; a division of Cooper Industries.
  - 2. ERICO/Michigan Hanger Co.
  - 3. Grinnell Corp.
  - 4. National Pipe Hanger Corporation.
  - 5. PHD Manufacturing, Inc.
  - 6. Piping Technology & Products, Inc.
- C. Galvanized, Metallic Coatings: Pre-galvanized or hot dipped.
- D. Nonmetallic Coatings: Plastic coating, jacket, or liner.
- E. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion for support of bearing surface of piping.

2.3 TRAPEZE PIPE HANGERS

- A. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural-steel shapes with MSS SP-58 hanger rods, nuts, saddles, and U-bolts.

2.4 METAL FRAMING SYSTEMS

- A. Description: MFMA-3, shop- or field-fabricated pipe-support assembly made of steel channels and other components.
- B. Manufacturers:

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1. B-Line Systems, Inc.; a division of Cooper Industries.
2. ERICO/Michigan Hanger Co.; ERISTRUT Div.
3. Power-Strut Div.; Tyco International, Ltd.
4. Thomas & Betts Corporation.
5. Unistrut Corp.; Tyco International, Ltd.

C. Coatings: Manufacturer's standard finish unless bare metal surfaces are indicated.

D. Nonmetallic Coatings: Plastic coating, jacket, or liner.

### **2.5 THERMAL-HANGER SHIELD INSERTS**

A. Description: 100-psig-minimum, compressive-strength insulation insert encased in sheet metal shield.

B. Manufacturers:

1. Carpenter & Paterson, Inc.
2. ERICO/Michigan Hanger Co.
3. PHS Industries, Inc.
4. Pipe Shields, Inc.
5. Rilco Manufacturing Company, Inc.
6. Value Engineered Products, Inc.

C. Insulation-Insert Material for Cold Piping: Water-repellent treated, ASTM C533, Type I calcium silicate or ASTM C552, Type II cellular glass with vapor barrier.

D. Insulation-Insert Material for Hot Piping: Water-repellent treated, ASTM C533, Type I calcium silicate or ASTM C552, Type II cellular glass.

E. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.

F. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.

G. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

### **2.6 FASTENER SYSTEMS**

A. Mechanical-Expansion Anchors: Insert-wedge-type zinc-coated steel, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

1. Manufacturers:
  - a. B-Line Systems, Inc.; a division of Cooper Industries.
  - b. Empire Industries, Inc.
  - c. Hilti, Inc.
  - d. ITW Ramset/Red Head.
  - e. MKT Fastening, LLC.
  - f. Powers Fasteners.

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2.7 EQUIPMENT SUPPORTS

- A. Description: Welded, shop- or field-fabricated equipment support made from structural-steel shapes.

2.8 MISCELLANEOUS MATERIALS

- A. Structural Steel: ASTM A36, steel plates, shapes, and bars; black and galvanized.

PART 3 – EXECUTION

3.1 HANGER AND SUPPORT APPLICATIONS

- A. Specific hanger and support requirements are specified in Sections specifying piping systems and equipment.
- B. Comply with MSS SP-69 for pipe hanger selections and applications that are not specified in piping system Sections.
- C. Use hangers and supports with galvanized, metallic coatings for piping and equipment that will not have field-applied finish.
- D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.
- E. Use padded hangers for piping that is subject to scratching.
- F. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
  - 1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of non-insulated or insulated stationary pipes, NPS 1/2 to NPS 30.
  - 2. Yoke-Type Pipe Clamps (MSS Type 2): For suspension of 120 to 450 deg F pipes, NPS 4 to NPS 16, requiring up to 4 inches of insulation.
  - 3. Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3): For suspension of pipes, NPS 3/4 to NPS 24, requiring clamp flexibility and up to 4 inches of insulation.
  - 4. Adjustable, Steel Band Hangers (MSS Type 7): For suspension of noninsulated stationary pipes, NPS 1/2 to NPS 8.
  - 5. U-Bolts (MSS Type 24): For support of heavy pipes, NPS 1/2 to NPS 30.
  - 6. Pipe Saddle Supports (MSS Type 36): For support of pipes, NPS 4 to NPS 36, with steel pipe base stanchion support and cast-iron floor flange.
  - 7. Single Pipe Rolls (MSS Type 41): For suspension of pipes, NPS 1 to NPS 30, from 2 rods if longitudinal movement caused by expansion and contraction might occur.
  - 8. Complete Pipe Rolls (MSS Type 44): For support of pipes, NPS 2 to NPS 42, if longitudinal movement caused by expansion and contraction might occur but vertical adjustment is not necessary.

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- G. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers, NPS 3/4 to NPS 20.
  2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers, NPS 3/4 to NPS 20, if longer ends are required for riser clamps.
- H. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.
  2. Steel Clevises (MSS Type 14): For 120 to 450 deg F piping installations.
- I. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
  2. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction to attach to top flange of structural shape.
  3. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
  4. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
  5. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.
  6. C-Clamps (MSS Type 23): For structural shapes.
  7. Welded-Steel Brackets: For support of pipes from below, or for suspending from above by using clip and rod. Use one of the following for indicated loads:
    - a. Light (MSS Type 31): 750 lb.
    - b. Medium (MSS Type 32): 1500 lb.
    - c. Heavy (MSS Type 33): 3000 lb.
  8. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
  9. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.
- J. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
  2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
  3. Thermal-Hanger Shield Inserts: For supporting insulated pipe.
- K. Comply with MSS SP-69 for trapeze pipe hanger selections and applications that are not specified in piping system Sections.
- L. Comply with MFMA-102 for metal framing system selections and applications that are not specified in piping system Sections.

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3.2 HANGER AND SUPPORT INSTALLATION

- A. Steel Pipe Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from building structure.
- B. Trapeze Pipe Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping and support together on field-fabricated trapeze pipe hangers.
  - 1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified above for individual pipe hangers.
  - 2. Field fabricate from ASTM A36, steel shapes selected for loads being supported. Weld steel according to AWS D1.1.
- C. Metal Framing System Installation: Arrange for grouping of parallel runs of piping and support together on field-assembled metal framing systems.
- D. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.
- E. Fastener System Installation:
  - 1. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.
- F. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.
- G. Equipment Support Installation: Fabricate from welded-structural-steel shapes.
- H. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.
- I. Install lateral bracing with pipe hangers and supports to prevent swaying.
- J. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 and larger and at changes in direction of piping.
- K. See details on plans or structural drawings for limitations on building attachments to metal bar joists and metal roof decks. Generally speaking, eccentric beam clamps may not be used on bar joists, and hangers may not be anchored to bare metal decks (without concrete topping). In limited cases, small duct run-outs to diffusers and small branch piping may be supported from bare metal deck, but only up to the load capacity of the deck (15-25 lb typical, to be validated by deck manufacturer).
- L. Load Distribution: Install hangers and supports so piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

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- M. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and so maximum pipe deflections allowed by ASME B31.9 (for building services piping) are not exceeded.
- N. Insulated Piping: Comply with the following:
  - 1. Attach clamps and spacers to piping.
    - a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
    - b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
    - c. Do not exceed pipe stress limits according to ASME B31.9 for building services piping.
  - 2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.
  - 3. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.
  - 4. Shield Dimensions for Pipe: Not less than the following:
    - a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.
    - b. NPS 4: 12 inches long and 0.06 inch thick.
    - c. NPS 5 and NPS 6: 18 inches long and 0.06 inch thick.
    - d. NPS 8 to NPS 14: 24 inches and 0.075 inch thick.
    - e. NPS 16 to NPS 24: 24 inches long and 0.105 inch thick.
  - 5. Pipes NPS 8 and Larger: Include wood inserts.
  - 6. Insert Material: Length at least as long as protective shield.
  - 7. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

**3.3 EQUIPMENT SUPPORTS**

- A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.
- B. Provide lateral bracing, to prevent swaying, for equipment supports.

**3.4 METAL FABRICATIONS**

- A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.
- B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.
- C. Field Welding: Comply with AWS D1.1 procedure for shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work, and with the following:
  - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
  - 2. Obtain fusion without undercut or overlap.
  - 3. Remove welding flux immediately.

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4. Finish welds at exposed connections so no roughness shows after finishing and contours of welded surfaces match adjacent contours.

3.5 ADJUSTING

- A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

END OF SECTION 220529

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SECTION 220553 - IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes:

1. Equipment labels.
2. Warning signs and labels.
3. Pipe labels.

1.2 SUBMITTAL

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

PART 2 – PRODUCTS

2.1 EQUIPMENT LABELS

A. Metal Labels for Equipment:

1. Material and Thickness: Stainless steel, 0.025-inch or anodized aluminum, 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
2. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
3. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
4. Fasteners: Stainless-steel rivets or self-tapping screws.
5. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

B. Plastic Labels for Equipment:

1. Material and Thickness: Acrylic, plastic labels for mechanical engraving, 1/4-inch-thick, and having predrilled holes for attachment hardware.
2. Letter Color: Engraved White.
3. Background Color: Black.
4. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
5. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
6. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
7. Fasteners: Stainless-steel rivets or self-tapping screws.



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8. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

C. Label Content: Include equipment's Drawing designation or unique equipment number, drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified.

D. Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch (A4) bond paper. Tabulate equipment identification number and identify Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

2.2 WARNING SIGNS AND LABELS

A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch (3.2 mm) thick, and having predrilled holes for attachment hardware.

B. Letter Color: Red.

C. Background Color: White.

D. Maximum Temperature: Able to withstand temperatures up to 160 deg F.

E. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.

F. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.

G. Fasteners: Stainless-steel rivets **or** self-tapping screws.

H. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

I. Label Content: Include caution and warning information, plus emergency notification instructions.

2.3 PIPE LABELS

A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.

B. Pre-tensioned Pipe Labels: Pre-coiled, semi rigid plastic formed to cover full circumference of pipe and to attach to pipe without fasteners or adhesive.

C. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.

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- D. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings, pipe size, and an arrow indicating flow direction.
  - 1. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions or as separate unit on each pipe label to indicate flow direction.
  - 2. Lettering Size: At least 1-1/2 inches high.

**PART 3 – EXECUTION**

**3.1 PREPARATION**

- A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

**3.2 EQUIPMENT LABEL INSTALLATION**

- A. Install or permanently fasten labels on each major item of mechanical equipment.
- B. Locate equipment labels where accessible and visible.

**3.3 PIPE LABEL INSTALLATION**

- A. Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:
  - 1. Near each valve and control device.
  - 2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
  - 3. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.
  - 4. At access doors, manholes, and similar access points that permit view of concealed piping.
  - 5. Near major equipment items and other points of origination and termination.
  - 6. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.
  - 7. On piping above, removable acoustical ceilings. Omit intermediately spaced labels.
- B. Pipe Label Color Schedule:
  - 1. Compressed-Air Piping:
    - a. Background Color: Light Gray
    - b. Letter Color: White
  - 2. Natural Gas Piping:
    - a. Background Color: Black
    - b. Letter Color: White
  - 3. Domestic Water Piping - Cold:
    - a. Background Color: Light Blue

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- b. Letter Color: White.
- 4. Domestic Water Piping - Hot:
  - a. Background Color: Dark Blue
  - b. Letter Color: White.
- 5. Sanitary Waste and Storm Drainage Piping:
  - a. Background Color: Brown.
  - b. Letter Color: White.

END OF SECTION 220553

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SECTION 220700 - PLUMBING INSULATION

PART 1 – GENERAL

1.1 SUMMARY

- A. This Section includes insulation requirements for plumbing piping as associated tanks, vessels and equipment.

1.2 SUBMITTALS

- A. Product Data: Provide product data for each type of insulation product indicated.
- B. Shop Drawings: Show details for the following:
  - 1. Application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
  - 2. Insulation application at elbows, fittings, flanges, valves, and specialties for each type of insulation.
  - 3. Removable insulation at piping specialties, valves, equipment connections, and access panels.
  - 4. Application of field-applied jackets.
- C. Insulation Schedule: Provide a schedule indicating insulation type and thickness and equivalent R-value for each mechanical system to be insulated. Indicate jacketing type to be utilized.

1.3 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of mechanical insulation products, of types and sizes required, whose products have been in satisfactory use in similar services for not less than 10 years.
- B. Installer's Qualifications: Firms with at least 5 years successful installation experience on projects with mechanical insulation systems similar to that required for this project.
- C. Flame/Smoke Ratings: Provide composite mechanical insulation (insulation, jackets, coverings, sealers, mastics and adhesives) with flame-spread index of 25 or less, and smoke developed index of 50 or less, as tested by ASTM E84 (NFPA 255) method.

1.4 CODES

- A. Insulation values shall conform with the latest edition of the Washington State Energy Code and ASHRAE recommendations.

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**PART 2 – PRODUCTS**

**2.1 MANUFACTURERS**

A. Subject to compliance with requirements, provide products of one of the following:

1. Armacell LLC
2. CertainTeed Corp.
3. Foster Products Corp.
4. IMCOA
5. Johns Manville Products Corp.
6. Knauf Fiber Glass GmbH.
7. Owens-Corning Fiberglas Corp.
8. Pittsburgh Corning Corp.

**2.2 PIPING INSULATION MATERIALS**

A. Fiberglass Piping Insulation: ASTM C411, ASTM C547, ASTM C585, ASTM C1136, K = 0.24 @ 100° F mean temperature. Equal to Johns Manville Micro-Lok. HP All Service (White ASJ) vapor retarder jacket with self sealing longitudinal closure LAP.

B. Elastomeric Piping Insulation: ASTM C534, Type 1, ASTM E84, NFFA 255, UL 723, K = 0.27 @ 75° F Mean temperature. Equal to AP Armaflex pipe insulation.

C. Pipe Fittings:

1. Fitting Insulation: Fittings, elbows, tees, unions, etc. shall be molded fiberglass fabricated specifically for pipe size, type, and adjacent insulation thickness. Only molded products are acceptable. Equal to Johns Manville Hi-Lo temperature fiber glass insulation inserts.
2. Pipe fitting covers shall be one-piece premolded 0.020” thick PVC fitting covers (equal to Johns Manville Zeston 2000 or Speedline Smoke-Safe), fastened as per manufacturer’s recommendations with fiberglass inserts. Color: White.

**2.3 PIPE INSULATION JACKETS**

A. PVC pipe jackets for interior applications shall be premolded 0.020” thick PVC wrap covers (equal to Johns Manville Zeston 2000 or Speedline Smoke-Safe), fastened as per manufacturer’s recommendations.

B. Aluminum jacket pipe insulation shall be 0.016” thick, stucco embossed finish, with a one mil polyethylene film/forty pound kraft paper integral vapor barrier affixed to the interior of the cover in conformance with ASTM B209. Elbows and fittings shall be jacketed with pre-formed 0.024” thick aluminum covers, with moisture retarder film.

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2.4 PIPE INSULATION REMOVABLE VALVE AND FITTING COVERS

- A. Valves and devices subject to service or operational needs shall be insulated with removable type covers. These include: Shut-off valves, balance valves (manual and automatic), control valves, venturis and strainers.
- B. Valves sets at terminal unit and air handling unit coil connections shall be covered with pre-insulated valve wraps equal to “No-Sweat” reusable and removable covers. Valve wraps shall consist or 1” thick insulation with a durable vapor barrier jacket material and Velcro closures.
- C. Larger body valves, strainers, etc. shall be covered with custom made or pre-manufactured removable covers utilizing either PTFE Fiberglass Composite Jacketing, 16.5 oz/sq. yd minimum density, inside and outside face, or Silicone-coated F.G. cloth with S.S. mesh inner lining, both with fiberglass insulation fill. Assembly shall be double sewn lock stitch with minimum 4 to 6 stitches per inch. Jackets shall be fasteners using hook and loop (Velcro) straps and 1” slide buckles or S.S. lacing hooks with Teflon-coated F.G. drawstrings.
- D. Flex hose connections on the chilled water coil connections to terminal units shall be covered with ½” thick elastomeric foam, pre-molded pipe sections, for condensation control.

2.5 EQUIPMENT INSULATION MATERIALS

- A. Rigid fiberglass equipment insulation shall conform ASTM C612, Class 2, 6.0 CF density, K = 0.23 @ 75° F mean temperature. Cover insulation with pre-sized glass cloth jacketing material, not less than 7.8 ounces per square yard. Provide a trowl or glove grade water based purpose mastic (white or light gray) suitable for interior or exterior applications. Install per manufacturer’s written installation instructions.
- B. Elastomeric Insulation: ASTM C534, Type 1, ASTM E84, NFPA 255, UL 723, K = 0.27 @ 75° F mean temperature, equal to Armaflex.

2.6 FASTENERS, MASTICS, SEALANTS, TAPES, ADHESIVES AND ACCESSORIES

- A. The insulation installer shall utilize accessory materials and devices for the complete and proper application of all insulation systems, in accordance with manufacturer’s directions and established good industry standards for materials and workmanship. All accessory products shall be compatible with the insulation materials being utilized.

PART 3 – EXECUTION

3.1 PLUMBING PIPING INSULATION

- A. Provide insulation for the following piping:

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<b>Pipe Insulation Systems</b>			
<b>Pipe Service</b>	<b>Location</b>	<b>Insulation Type</b>	<b>Insulation Cover<sup>1</sup></b>
Potable & Non-Potable Hot, Cold, Tempered & Recirc. Hot Water	Building	Fiberglass	ASJ
	Exterior	Elastomeric	Metal Jacket
Make-up Water	Building	Fiberglass	ASJ
	Exterior	Elastomeric	Metal Jacket
Condensate Drains	Building	None	N/A
PVC Piping Run in Ceiling Plenums	Building	Fiberglass	ASJ
Roof /Over flow Drain Leaders & Drain Bodies	Building	Fiberglass	ASJ
	Exterior	None	N/A

Pipe Insulation System Notes:

1. All insulated piping located in mechanical equipment rooms, platforms or other accessible spaces, located below the 10 ft level, shall be covered with PVC jacketing.

- B. Provide minimum pipe insulation as listed in following table:

Fluid Design Operating Temp. Range, °F	Insulation Conductivity		Nominal Pipe Diameter (in.)					
	Conductivity Range BTUxin/(hxft <sup>2</sup> x°F)	Mean Rating Temp. °F	Runouts <sup>2</sup> up to 1.5	1 and less	>1 to 1.5	>1.5 to 4	>4 to 8	>8
Heating Systems (Steam, Steam Condensate and Heating water)			Nominal Insulation Thickness					
Above 350	0.32-0.34	250	3.5	4.5	5.0	5.0	5.0	5.0
251-350	0.29-0.31	200	2.0	3.0	4.0	4.5	4.5	4.5
201-250	0.27-0.30	150	1.5	2.5	2.5	2.5	3.0	3.0
141-200	0.25-0.29	125	1.0	1.5	2.0	2.0	2.0	2.0
105-140	0.24-0.28	100	0.5	1.0	1.0	1.5	1.5	1.5
Domestic and Service Hot Water Systems								
105 and Greater	0.24-0.28	100	0.5	1.0	1.0	1.5	1.5	1.5
Chilled and Cold Systems (Domestic Cold Water, Chilled Water, Make-up Water and Refrigerant)								
40-60	0.23-0.27	75	0.5	0.5	1.0	1.0	1.0	1.5

1. The following temperatures shall be used for determining the insulation thickness required for each piping system:

- a. Domestic Hot Water Supply and Recirc. Piping = 130oF
- b. Domestic Cold Water Piping = 50°F
- c. Make-up Water Piping = 50°F
- d. Roof Drain Piping = 50°F
- e. Refrigerant Piping = 40°F

- C. Plumbing piping system insulation omitted on chrome plated exposed piping (except for handicapped fixtures), air chamber, unions, etc.

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1. Special Application Requirements: Insulate interior above-ground horizontal storm water piping, 1” thickness.
2. Insulate all exposed piping under ADA compliant lavatories with a white, fitted anti-microbial pipe cover. Cover shall be designed to allow access to the stop valves. Lav Guard; Truebro, Inc.

3.2 EQUIPMENT INSULATION

A. Application Requirements: Insulate the following cold (below ambient) equipment:

1. Cold water storage tanks.
2. Cold and chilled water pump impeller housings .
3. Pneumatic water tanks.
4. Roof drain bodies.

B. Application Requirements: Insulate with 2” thick rigid fiberglass the following hot (above ambient temperature) equipment:

1. Hot water storage tanks.
2. Heat exchangers.
3. Hot water pumps impeller housings.

3.3 COMMON INSTALLATION REQUIREMENTS

- A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of equipment, ducts and fittings, and piping including fittings, valves, and specialties.
- B. Install insulation with tightly butted joints free of voids and gaps. Vapor barriers shall be continuous. Before installing jacket material, install vapor-barrier system.
- C. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of equipment, duct system, and pipe system as specified in insulation system schedules.
- D. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
- E. Install insulation with longitudinal seams at top and bottom of horizontal runs.
- F. Install multiple layers of insulation with longitudinal and end seams staggered.
- G. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.
- H. Keep insulation materials dry during application and finishing.



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- I. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.
- J. Install insulation with least number of joints practical.
- K. Hangers and Anchors: Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.
  - 1. Install insulation continuously through hangers and around anchor attachments.
  - 2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
  - 3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
  - 4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.
- L. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.
- M. Install insulation with factory-applied jackets as follows:
  - 1. Draw jacket tight and smooth.
  - 2. Cover circumferential joints with 3-inch- wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
  - 3. Overlap jacket longitudinal seams at least 1-1/2 inches. Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 2 inches o.c. For below ambient services, apply vapor-barrier mastic over staples.
  - 4. Cover joints and seams with tape as recommended by insulation material manufacturer to maintain vapor seal.
  - 5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to duct and pipe flanges and fittings.
- N. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.
- O. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.
- P. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.
- Q. For above ambient services, do not install insulation to the following:
  - 1. Vibration-control devices.
  - 2. Testing agency labels and stamps.
  - 3. Nameplates and data plates.

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4. Manholes.
5. Handholes.
6. Cleanouts.

3.4 PENETRATIONS

- A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.
  1. Seal penetrations with flashing sealant.
  2. For applications requiring only indoor insulation, terminate insulation above roof surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
  3. Extend jacket of outdoor insulation outside roof flashing at least 2 inches below top of roof flashing.
  4. Seal jacket to roof flashing with flashing sealant.
- B. Insulation Installation at Below-Grade Exterior Wall Penetrations: Terminate insulation flush with sleeve seal. Seal terminations with flashing sealant.
- C. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.
  1. Seal penetrations with flashing sealant.
  2. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
  3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches.
  4. Seal jacket to wall flashing with flashing sealant.
- D. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.
- E. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions. Terminate insulation at fire damper sleeves for fire-rated wall and partition penetrations. Externally insulate damper sleeves to match adjacent insulation and overlap duct insulation at least 2 inches.
- F. Insulation Installation at Floor Penetrations:
  1. Duct: Install insulation continuously through floor penetrations that are not fire rated. For penetrations through fire-rated assemblies, terminate insulation at fire damper sleeves and externally insulate damper sleeve beyond floor to match adjacent duct insulation. Overlap damper sleeve and duct insulation at least 2 inches.
  2. Pipe: Install insulation continuously through floor penetrations.

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3. Seal penetrations through fire-rated assemblies according to Division 07 Section "Firestopping."

3.5 INSTALLATION OF HOT PIPING INSULATION

- A. After installation of heat tracing, painting, testing, and acceptance of tests, install insulation products in accordance with manufacturer's written instructions, and in accordance with recognized industry practices to ensure that insulation serves its intended purpose.
- B. Maintain integrity of vapor barrier jacket on pipe insulation, and protect to prevent puncture or other damage.
- C. Cover valves, fittings, and similar items in each piping system  $\leq 2$ " with equivalent thickness and composition of insulation as applied to adjoining pipe run. PVC Pipe fittings shall be utilized at all fittings.
- D. Install removable covers on all valves, flow balance devices, strainers, etc.
- E. Extend Piping insulation without interruption through walls, floors and similar piping penetrations, except where penetrations go through fire rated construction.
- F. Cover exposed ends of fiberglass with a vapor retardant mastic.
- G. Butt pipe insulation against pipe hanger insulation inserts. Apply 3" wide vapor barrier tape or band over the butt joints.
- H. Fasten aluminum jacket to insulation using strapping and wing seals of the same material as the cover. In exterior applications, insure that all seams are watertight. Follow manufacturer's written installation guidelines.
- I. For hot water heating, install a polyurethane insulation insert at hangers on all piping 2" and larger. Insert material shall be at least as long as the protective shield.
- J. For steam piping, Install inserts and metal shield.

3.6 INSTALLATION OF COLD PIPING INSULATION

- A. After painting, testing, and acceptance of tests, install insulation products in accordance with manufacturer's written instructions, and in accordance with recognized industry practices in ensure that insulation serves its intended purpose. Insulation must be applied so there are no voids between the inner insulation face and cold piping system. The insulation system must be installed in such a manner that the piping system will not condense.
- B. Maintain integrity of vapor barrier jackets on pipe insulation, and protect to prevent puncture or other damage. Special care must be made to maintain the vapor barrier at PVC fittings and with pipe covered with aluminum jackets.
- C. Cover valves, fitting and similar items in each piping system with insulation as applied to adjoining pipe run. Extra care must be taken on piping appurtenances to insure a tight fit to the adjoining fiberglass system insulation. Pump impeller housings, air separators, etc. must be

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totally encapsulated with insulation.

1. Install fabricated molded insulation inserts at the pipe fittings under the PVC fitting.
- D. Install removable covers on all valves, flow balance devices, strainers, etc.
- E. Extend piping insulation without interruption through walls, floors and similar piping penetrations, except where penetrations go through fire rated construction. At fire rated construction, stop insulation at each side of the penetration, fill the interstitial space between the fire caulk with mineral wool (or other approved material), and seal penetration to maintain fire rating.
- F. Cover exposed ends of fiberglass with a vapor retardant mastic.
- G. Elastomeric Insulation:
1. Glue the butt ends of insulation to each other to form a homogenous membrane maintaining the vapor barrier.
  2. Exterior elastomeric insulation shall be installed with the longitudinal seam on the bottom of the pipe and shall be protected with an ultra violet resistive paint.
- H. Butt pipe insulation against pipe hanger insulation inserts. Apply wet coat of vapor barrier lap cement on butt joints and over staples and seal joints with 3" wide vapor barrier tape or band.
- I. Fasten aluminum jacket to insulation using strapping and wing seals of the same material as the cover. In exterior applications, insure that all seams are watertight. Follow manufacturer's written installation guidelines.
- J. Install a polyurethane insulation insert at hangers on all piping 2" and larger. Insert material shall be at least as long as the protective shield.

### **3.7 INSTALLATION OF EQUIPMENT INSULATION**

- A. Install equipment thermal insulation products in accordance with manufacturer's written instructions, and in compliance with recognized industry practices to ensure that insulation serves the intended purpose.
- B. Install insulation materials with smooth and even surfaces and on clean and dry surfaces. Redo poorly fitted joints. Do not use mastic or joint sealer as filler for gapping joints and excessive voids resulting from poor workmanship.
- C. Maintain integrity of vapor barrier on equipment insulation and protect it to prevent puncture or other damage.
- D. Do not apply insulation to equipment while hot.
- E. Apply insulation using the staggered joint method for both single and double layer construction, where feasible. Apply each layer of insulation separately.

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- F. Coat insulated surfaces with layer of insulating cement, troweled in workmanlike manner, leaving a smooth continuous surface. Fill in scored block, seams, chipped edges and depressions, and cover over wire netting and joints with cement of sufficient thickness to remove surface irregularities.
- G. Cover fiberglass insulated surfaces with all-service jacketing neatly fitted and firmly secured. Lap seams at least 2". Apply over vapor barrier where applicable.
- H. Do not insulate handholes, cleanouts, ASME stamp, and manufacturer's nameplate. Provide neatly beveled edge at interruptions of insulation.
- I. Provide removable insulation sections to cover parts of equipment that must be opened periodically for maintenance; include metal vessel covers, fasteners, flanges, frames, and accessories.
- J. Protect outdoor insulation from weather by installation of weather-barrier mastic protective finish or jacketing, as recommended by the manufacturer.

END OF SECTION 220700

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SECTION 221116 - DOMESTIC WATER PIPING

PART 1 – GENERAL

1.1 SUMMARY

- A. This Section includes domestic water piping inside the building.
- B. See Section 22 11 19 – Domestic Water Piping Specialties, for water distribution piping specialties.

1.2 SUBMITTALS

- A. Field quality-control test reports.

1.3 QUALITY ASSURANCE

- A. Comply with NSF 61, "Drinking Water System Components - Health Effects; Sections 1 through 9," for potable domestic water piping and components.
- B. All domestic water piping associated fittings and trim shall comply with ANSI/NSF 61-8, Annex G and US Senate Bill S.3874 for the wetted surface of all potable water plumbing components as it relates to LEAD-FREE construction.

PART 2 – PRODUCTS

2.1 PIPING MATERIALS

- A. Refer to Part 3 "Pipe and Fitting Applications" Article for applications of pipe, tube, fitting, and joining materials.
- B. Transition Couplings for Aboveground Pressure Piping: Coupling or other manufactured fitting the same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.
- C. Hard Copper Tube: ASTM B88, Types L water tube, drawn temper.
  - 1. Copper Pressure Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought-copper, solder-joint fittings. Furnish wrought-copper fittings if indicated.
  - 2. Bronze Flanges: ASME B16.24, Class 150, with solder-joint ends. Furnish Class 300 flanges if required to match piping.
  - 3. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces, and solder-joint or threaded ends.

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- D. Uponor Cross-linked polyethylene pipe: ISO 15875 and DIN EN 13501-1 dimensional standards. Listed by NSF International to NSF standards 14 and 61 for use in potable water systems and listed by NSF to be compliant with the Uniform Plumbing Code.
- E. Press-Fit pipe and fitting equal to Pro-Press systems.
  - 1. Joints: All fittings to be lead free brass with brass or poly alloy crimp rings.
  - 2. Fittings: All fittings to be lead free brass with either ductile copper crimp rings or stainless steel cinch clamps.
  - 3. All system components that are contacted by consumable water to meet the Lead Free requirements.

2.2 VALVES

- A. Bronze and cast-iron, general-duty valves are specified in Section 22 05 23 – General-Duty Valves for Plumbing Piping.
- B. Balancing and drain valves are specified in Section 22 11 19 – Domestic Water Piping Specialties.

PART 3 – EXECUTION

3.1 PIPE AND FITTING APPLICATIONS

- A. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below, unless otherwise indicated.
- B. Flanges may be used on aboveground piping, unless otherwise indicated.
- C. All piping routed inside of exterior wall, shall be Installed on the warm side of building insulation.
- D. Below ground Domestic Water Piping: Use the following piping materials for each size range:
  - 1. NPS 1 and Smaller: Annealed copper tube, Type K; no joints.
  - 2. NPS 1-1/4 and NPS 1-1/2: Annealed copper tube, Type K; copper pressure fittings and silver brazed joints.
  - 3. NPS 2: Annealed copper tube, Type K; copper pressure fittings and silver brazed joints.
  - 4. NPS 2-1/2 to NPS 3-1/2: Annealed copper tube, Type K; copper pressure fittings and silver brazed joints.
  - 5. NPS 4 to NPS 6: Steel pipe; gray-iron, threaded fittings; and threaded joints.
  - 6. NPS 4 to NPS 6: Annealed copper tube, Type K; copper pressure fittings and silver brazed joints.
  - 7. Trap primer piping: P-Xa Tubing as manufactured by uponor commercial systems.
- E. Aboveground Domestic Water Piping: Use the following piping materials for each size range:

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1. NPS 1 and Smaller: Drawn copper tube, Type L; copper pressure fittings; and soldered joints.
2. NPS 1-1/4 and NPS 1-1/2: Drawn copper tube, Type L; copper pressure fittings; and soldered joints.
3. NPS 2: Drawn copper tube, Type L; copper pressure fittings and silver brazed joints.
4. NPS 2-1/2 to NPS 4: Drawn copper tube, Type L; copper pressure fittings; and silver brazed joints.
5. NPS 3/4" and smaller for individual run outs and connections to fixtures: Uponor

PE-Xa polyethylene pipe: ISO 15875 and DIN EN 13501-1 dimensional standards. Listed by NSF International to NSF standards 14 and 61 for use in potable water systems and listed by NSF to be compliant with the Uniform Plumbing Code. Joints: All fittings to be lead free brass with brass or poly alloy crimp rings. Fittings: All fittings to be lead free brass with either ductile copper crimp rings or stainless steel cinch clamps. All system components that are contacted by consumable water to meet the Lead-Free requirements.

6. NPS 1" and smaller. NPS 1-1/4 to NPS 4": Drawn copper tube, Type L; copper press fit pipe and fittings.

### 3.2 VALVE APPLICATIONS

- A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:
  1. Shutoff Duty: Use bronze full port ball valves with threaded ends for piping NPS 2 and smaller. Use cast-iron butterfly valves with flanged ends for piping NPS 2-1/2 and larger.
  2. Throttling Duty: Use bronze ball or globe valves for piping NPS 2 and smaller. Use cast-iron butterfly valves with flanged ends for piping NPS 2-1/2 and larger.
  3. Hot-Water-Piping, Balancing Duty: Calibrated balancing valves.
  4. Drain Duty: Hose-end drain valves.
- B. Install shutoff valve close to water main on each branch and riser serving equipment, on each water supply to equipment. Use full port threaded ball valves for piping NPS 2 and smaller. Use butterfly valves for piping NPS 2-1/2 and larger.
- C. Install drain valves for equipment at base of each water riser, at low points in horizontal piping, and where required to drain water piping.
  1. Install hose-end drain valves at low points in water mains, risers, and branches.
  2. Install stop-and-waste drain valves where indicated.
- D. Install calibrated balancing valves in each hot-water circulation return branch and discharge side of each pump and circulator. Set calibrated balancing valves partly open to restrict but not stop flow. Calibrated balancing valves are specified in Section 22 11 19 – Domestic Water Piping Specialties.

### 3.3 PIPING INSTALLATION



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- A. Basic piping installation requirements are specified in Section 22 05 00 – Common Work Results for Plumbing.
- B. Install shutoff valve, hose-end drain valve, strainer, pressure gage, and test tee with valve, inside the building at each domestic water service entrance. Pressure gages are specified in Section 22 05 19 - Meters and Gages, and drain valves and strainers are specified in Section 22 11 19 – Domestic Water Piping Specialties.
- C. Install domestic water piping level without pitch and plumb.

3.4 JOINT CONSTRUCTION

- A. Basic piping joint construction requirements are specified in Section 22 05 00 – Common Work Results for Plumbing.
- B. Soldered Joints: Use ASTM B813, water-flushable, lead-free flux; ASTM B32, lead-free-alloy solder; and ASTM B828 procedure, unless otherwise indicated.
- C. Silver Brazed Joints on piping 2” and above.

3.5 HANGER AND SUPPORT INSTALLATION

- A. Pipe hanger and support devices are specified in Section 22 05 29 - Hangers and Supports for Plumbing Piping and Equipment. Install the following:
  - 1. Vertical Piping: MSS Type 8 or Type 42, clamps.
  - 2. Individual, Straight, Horizontal Piping Runs: According to the following:
    - a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
    - b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
    - c. Longer Than 100 Feet: MSS Type 49, spring cushion rolls, if indicated.
  - 3. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
  - 4. Base of Vertical Piping: MSS Type 52, spring hangers.
- B. Install supports according to Section 22 05 29 - Hangers and Supports for Plumbing Piping and Equipment.
- C. Support vertical piping and tubing at base and at each floor.
- D. Rod diameter may be reduced 1 size for double-rod hangers, to a minimum of 3/8 inch.
- E. Install hangers for steel piping with the following maximum horizontal spacing and minimum rod diameters:
  - 1. NPS 1-1/4 and Smaller: 84 inches with 3/8-inch rod.
  - 2. NPS 1-1/2: 108 inches with 3/8-inch rod.
  - 3. NPS 2: 10 feet with 3/8-inch rod.
  - 4. NPS 2-1/2: 11 feet with 1/2-inch rod.
  - 5. NPS 3 and NPS 3-1/2: 12 feet with 1/2-inch rod.

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6. NPS 4 and NPS 5: 12 feet with 5/8-inch rod.
  7. NPS 6: 12 feet with 3/4-inch rod.
- F. Install supports for vertical steel piping every 15 feet.
- G. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:
1. NPS 3/4 and Smaller: 60 inches with 3/8-inch rod.
  2. NPS 1 and NPS 1-1/4: 72 inches with 3/8-inch rod.
  3. NPS 1-1/2 and NPS 2: 96 inches with 3/8-inch rod.
  4. NPS 2-1/2: 108 inches with 1/2-inch rod.
  5. NPS 3 to NPS 5: 10 feet with 1/2-inch rod.
  6. NPS 6: 10 feet with 5/8-inch rod.
- H. Install supports for vertical copper tubing every 10 feet.
- I. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.6 CONNECTIONS

- A. Install piping adjacent to equipment and machines to allow service and maintenance.
- B. Connect new domestic water piping to existing domestic water piping. Use transition fitting to join dissimilar piping materials.
- C. Connect domestic water piping to water-service piping with shutoff valve, and extend and connect to the following:
1. Water Heaters: Cold-water supply and hot-water outlet piping in sizes indicated, but not smaller than sizes of water heater connections.
  2. Equipment: Cold- and hot-water supply piping as indicated, but not smaller than equipment connections. Provide shutoff valve and union for each connection. Use flanges instead of unions for NPS 2-1/2 and larger.

3.7 FIELD QUALITY CONTROL

- A. Inspect domestic water piping as follows:
1. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.
  2. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:
    - a. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
    - b. Final Inspection: Arrange final inspection for authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

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3. Re-inspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for re-inspection.
4. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

B. Test domestic water piping as follows:

1. See Section 22 00 00 - Plumbing General Provisions for additional requirements.
2. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.
3. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
4. Leave new, altered, extended, or replaced domestic water piping uncovered and uncealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.
5. Cap and subject piping to static water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
6. Repair leaks and defects with new materials and retest piping or portion thereof until satisfactory results are obtained.
7. Prepare reports for tests and required corrective action.

3.8 CLEANING

- A. Clean and disinfect potable domestic water piping using purging and disinfecting procedures as described in Section 22 00 00 - Plumbing General Provisions.
- B. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedures if biological examination shows contamination.
- C. Prepare and submit reports of purging and disinfecting activities.

END OF SECTION 221116

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SECTION 221119 - DOMESTIC WATER PIPING SPECIALTIES

PART 1 – GENERAL

1.1 SUMMARY

A. This Section includes the following domestic water piping specialties:

1. Vacuum breakers.
2. Strainers.
3. Hose bibbs.
4. Drain valves.
5. Potable Water Bladder Expansion Tanks.
6. Trap Primers.
7. Water Hammer Arresters.

1.2 PERFORMANCE REQUIREMENTS

A. Minimum Working Pressure for Domestic Water Piping Specialties: 125 psig, unless otherwise indicated.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Field quality-control test reports.
- C. Operation and maintenance data.

1.4 QUALITY ASSURANCE

- A. NSF Compliance:
  1. Comply with NSF 61, "Drinking Water System Components - Health Effects; Sections 1 through 9."
- B. All domestic water piping specialties indicated above and associated fittings and trim shall comply with ANSI/NSF 61-8, Annex G and US Senate Bill S.3874 for the wetted surface of all potable water plumbing components as it relates to LEAD-FREE construction.

PART 2 – PRODUCTS

2.1 VACUUM BREAKERS

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A. Hose-Connection Vacuum Breakers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Jay R. Smith
  - b. Watts Industries, Inc.; Water Products Div.
  - c. Woodford Manufacturing Company.
  - d. Zurn Plumbing Products Group
2. Standard: ASSE 1001.
3. Body: Bronze, non-removable, with manual drain.
4. Outlet Connection: Garden-hose threaded complying with ASME B1.20.7.
5. Finish: Chrome or nickel plated.

2.2 STRAINERS FOR DOMESTIC WATER PIPING

A. Y-Pattern Strainers:

1. Pressure Rating: 125 psig minimum, unless otherwise indicated.
2. Body: Bronze for NPS 2 and smaller; cast iron with interior lining complying with AWWA C550 or FDA-approved, epoxy coating and for NPS 2-1/2 and larger.
3. End Connections: Threaded for NPS 2 and smaller; flanged for NPS 2-1/2 and larger.
4. Screen: Stainless steel with round perforations, unless otherwise indicated.
5. Perforation Size:
  - a. Strainers NPS 2 and Smaller: 0.020 inch
  - b. Strainers NPS 2-1/2 to NPS 4: 0.045 inch.
  - c. Strainers NPS 5 and Larger: 0.10 inch.
6. Drain: Factory-installed, hose-end drain valve.

2.3 HOSE BIBBS

A. Hose Bibbs:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Jay R. Smith
  - b. Woodford Manufacturing Company. (for indoor hose bibs only)
  - c. Zurn Plumbing Products Group
2. Standard: ASME A112.18.1 for sediment faucets.
3. Body Material: Bronze.
4. Seat: Bronze, replaceable.
5. Supply Connections: NPS 3/4 threaded or solder-joint inlet.
6. Outlet Connection: Garden-hose thread complying with ASME B1.20.7.
7. Pressure Rating: 125 psig.
8. Vacuum Breaker: Integral, non-removable, drainable, hose-connection vacuum breaker complying with ASSE 1011.
9. Finish for Equipment Rooms: Rough bronze, or chrome or nickel plated.
10. Finish for Service Areas: Rough bronze.
11. Finish for Finished Rooms: Chrome or nickel plated.
12. Operation for Equipment Rooms: Wheel handle or operating key.

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13. Operation for Service Areas: Wheel handle.
14. Operation for Finished Rooms: Operating key.
15. Operation for building exterior: Operating key.
16. Include operating key with each operating-key hose bibb.
17. Include integral wall flange with each chrome- or nickel-plated hose bibb.
18. Valve shall be freeze proof type. Chamber length shall be sized to accommodate wall thickness at bibb locations indicated on the drawings.

### 2.4 DRAIN VALVES

#### A. Ball-Valve-Type, Hose-End Drain Valves:

1. Standard: MSS SP-110 for standard-port, two-piece ball valves.
2. Pressure Rating: 400-psig minimum CWP.
3. Size: NPS 3/4.
4. Body: Copper alloy.
5. Ball: Chrome-plated brass.
6. Seats and Seals: Replaceable.
7. Handle: Vinyl-covered steel.
8. Inlet: Threaded or solder joint.
9. Outlet: Threaded, short nipple with garden-hose thread complying with ASME B1.20.7 and cap with brass chain.

### 2.5 POTABLE WATER BLADDER EXPANSION TANKS

#### A. Bladder Expansion Tanks

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Wessels.
  - b. Amtrol.
  - c. Armstrong.
  - d. Taco.
2. The pressurization system shall include a bladder-type expansion tank which will accommodate the expanded water of the system generated within the normal operating temperature range, limiting this pressure increase at all components in the system to the maximum allowable pressure of those components.
3. The expansion tank shall be welded steel, constructed, tested and stamped in accordance with Section VIII of the ASME Code for a working pressure of 125 psig and pre-charge to the minimum operating pressure.
4. Diaphragm: Sealed into tank, flexible.
5. Tank shall be ASME rated.
6. Accessories: Pressure gauge and air-charging fitting, tank drain.
7. All wetted components shall be of FDA approved materials.

### 2.6 TRAP PRIMERS

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- A. Mechanical Type Primer – Flush valve actuated with vacuum breaker and associated chrome plated primer tubing, fittings and escutcheon.
- B. Electronic Type Primer – Cast bronze construction with integral vacuum breaker, distribution header and electronic timer within surface or recessed mounted cabinet. Interlock with building EMS.
- C. Mechanical trap primer assemblies installed in small diameter water lines serving often used fixtures may be used where serving a remote single floor drain where electronic or flush valve mechanical type trap primers are not indicated.

2.7 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Sloan. (flush valve actuated)
  - 2. Precision Plumbing Products. (Electronic)
  - 3. Precision Plumbing Products. (Mechanical)
- B. Standard: ASME A112.1.2, for fitting designed to ensure fixed, positive air gap between installed inlet and outlet piping.
- C. Body: Bronze or cast iron.
- D. Inlet: Opening in top of body.
- E. Outlet: Larger than inlet.
- F. Size: Same as connected water piping and with outlet large enough for associated trap primer piping.

2.8 WATER HAMMER ARRESTERS

- A. Water Hammer Arresters:
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. AMTROL, Inc.
    - b. PPP Inc.
    - c. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
  - 2. Standard: ASSE 1010 or PDI-WH 201.
  - 3. Type: Bellows with threaded ends.

PART 3 – EXECUTION

3.1 INSTALLATION

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- A. Refer to Section 22 05 00 – Common Work Results for Plumbing, for piping joining materials, joint construction, and basic installation requirements.
- B. Install balancing valves in locations where they can easily be adjusted.
- C. All piping routed inside of exterior wall, shall be Installed on the warm side of building insulation.
- D. Install Y-pattern strainers for water on supply side of each control valve, water pressure-reducing valve, solenoid valve, and pump.
- E. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping and specialties.
- F. Distinguish among multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations, in addition to identifying unit. Nameplates and signs are specified in Section 22 05 53 – Identification for Plumbing Piping and Equipment.

3.2 FIELD QUALITY CONTROL

- A. Remove and replace malfunctioning domestic water piping specialties and retest as specified above.

END OF SECTION 221119



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SECTION 221316 - SANITARY WASTE AND VENT PIPING

PART 1 – GENERAL

1.1 SUMMARY

- A. This Section includes the following soil and waste, sanitary drainage and vent piping inside the building:
  - 1. Pipe, tube, and fittings.
  - 2. Special pipe fittings.

1.2 PERFORMANCE REQUIREMENTS

- A. Components and installation shall be capable of withstanding the following minimum working pressure, unless otherwise indicated:
  - 1. Soil, Waste, and Vent Piping: 10-foot head of water.

1.3 SUBMITTALS

- A. Field quality-control inspection and test reports.

1.4 QUALITY ASSURANCE

- A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

PART 2 – PRODUCTS

2.1 PIPING MATERIALS

- A. Sanitary Waste and Vent Piping (Above Grade)
  - 1. Pipe: ASTM A888, no hub, cast iron. CISPI Standard 301, twice bituminous coated. Pipe showing rust or cracks in coating shall be removed and replaced. Tyler or Charlotte.
    - a. Fittings:
      - 1) Above-Grade No-Hub Joints: Manufactured by Clamp-All, Tyler or Charlotte. Stainless steel shield with 4 or 6 bands and neoprene gasket conforming to ASTM C564, CISPI 301. Hubless Cast-Iron Pipe and Fittings: ASTM A888 or CISPI 301.
- B. Acid Resistant Sanitary Waste and Vent Piping (Above Grade)
  - 1. Pipe: ASTM Cell Class 23447, CPVC Schedule 40 NFS-cw, ASTM F 2618. Manufactured by Charlotte.

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- b. Fittings:
  - 1) CPVC Schedule 40 drainage pattern, ASTM F 2618 and ASTM F 493 with solvent welded fittings and joints: Manufactured by Charlotte.
  
- B. Note: CPVC piping located in plenum spaces shall either meet the requirements of the flame spread/ smoke developed rating for plenum spaces or be completely wrapped by insulating system meeting the requirements of the flame spread/ smoke developed rating for installation within plenum spaces.
  
- C. Note: Acid Resistant Waste and Vent piping shall serve all plumbing fixtures located within the Science Class rooms Acid Resistant piping shall route minimum 5'-0" after last fixture served before connecting to Non-Acid resistant waste piping. Acid resistant Vent piping shall serve only the fixtures indicated above and shall terminate at the roof separately from Non-Acid Resistant Vent piping.
  
- D. Sanitary Vent Piping (Above Grade: from above cast-iron waste fitting on fixture served and thru the roof)
  - 1. ABS Pipe: ASTM D3965 and ASTM F628, Schedule 40 drain, waste and vent. Charlotte.
    - a. Fittings:
      - 1) ASTM D2661 ABS socket type fittings made to ASTM D3311 drain, waste and vent patterns. Solvent-cement joints.
  
- E. Sanitary Waste and Vent Piping (Below Grade)
  - 1. Pipe: ASTM A888, no hub, cast iron. CISPI Standard 301, twice bituminous coated. Pipe showing rust or cracks in coating shall be removed and replaced. Tyler or Charlotte.
    - a. Fittings:
      - 1) No-Hub Joints (Heavy Duty, Manufactured by Clamp-All, Tyler or Charlotte. Conforming to ASTM C564, CISPI 301 and FM 1680 standards. Stainless steel shield with 4 or 6 band neoprene gasket.
  - 2. PVC Pipe: ASTM D2665, Schedule 40 Solid-wall drain, waste and vent (Below grade only up to no-hub coupling transition to cast-iron at grade or slab level):
    - a. Fittings:
      - 1) ASTM D2665 PVC socket type fittings, made to ASTM D3311, drain, waste and vent patterns. Solvent-cement joints.
  
- F. Acid Resistant Sanitary Waste and Vent Piping (Below Grade)
  - 1. Pipe: ASTM Cell Class 23447, CPVC Schedule 40 NFS-cw, ASTM F 2618 and ASTM D 2321 and ASTM F 1668. Manufactured by Charlotte.
    - a. Fittings:
      - 1) CPVC Schedule 40 drainage pattern, ASTM F 2618 and ASTM F 493 with solvent welded fittings and joints: Manufactured by Charlotte.
  
- G. Note: Acid Resistant Waste and Vent piping shall serve all plumbing fixtures located within the Science Class rooms Acid Resistant piping shall route minimum 5'-0" after last fixture served before connecting to Non-Acid resistant waste piping. Acid resistant Vent piping shall serve only the fixtures indicated above and shall terminate at the roof separately from Non-Acid Resistant Vent piping.

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**PART 3 – EXECUTION**

**3.1 PIPING APPLICATIONS**

- A. Special pipe fittings with pressure ratings at least equal to piping pressure ratings may be used in applications below, unless otherwise indicated.
- B. Flanges and unions may be used on aboveground pressure piping, unless otherwise indicated.

**3.2 PIPING INSTALLATION**

- A. Basic piping installation requirements are specified in Section 22 05 00 – Common Work Results for Plumbing.
- B. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."
- C. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8-bend fittings if 2 fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.
- D. Lay buried building drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.
- E. Install soil and waste drainage and vent piping at the following minimum slopes, unless otherwise indicated:
  - 1. Building Sanitary Drain: 2 percent downward in direction of flow for piping NPS 3 and smaller; 1 percent downward in direction of flow for piping NPS 4 and larger.
  - 2. Horizontal Sanitary Drainage Piping: 2 percent downward in direction of flow.
  - 3. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.
- F. Sleeves are not required for cast-iron soil piping passing through concrete slabs-on-grade if slab is without membrane waterproofing.
- G. Install PVC soil and waste drainage and vent piping according to ASTM D2665.
- H. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

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3.3 JOINT CONSTRUCTION

- A. Basic piping joint construction requirements are specified in Section 22 05 00 – Common Work Results for Plumbing.
- B. Cast-Iron, Soil-Piping Joints: Make joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."
  - 1. Gasketed Joints: Make with rubber gasket matching class of pipe and fittings.
  - 2. Hubless Joints: Make with rubber gasket and sleeve or clamp.
- C. Soldered Joints: Use ASTM B813, water-flushable, lead-free flux; ASTM B32, lead-free-alloy solder; and ASTM B828 procedure, unless otherwise indicated.

3.4 HANGER AND SUPPORT INSTALLATION

- A. Pipe hangers and supports are specified in Section 22 05 29 - Hangers and Supports for Plumbing Piping and Equipment. Install the following:
  - 1. Vertical Piping: MSS Type 8 or Type 42, clamps.
  - 2. Individual, Straight, Horizontal Piping Runs: According to the following:
    - a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
    - b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
    - c. Longer Than 100 Feet, if Indicated: MSS Type 49, spring cushion rolls.
  - 3. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
  - 4. Base of Vertical Piping: MSS Type 52, spring hangers.
- B. Install supports according to Section 22 05 29 - Hangers and Supports for Plumbing Piping and Equipment.
- C. Support vertical piping and tubing at base and at each floor.
- D. Rod diameter may be reduced 1 size for double-rod hangers, with 3/8-inch minimum rods.
- E. Install hangers for cast-iron soil piping with the following maximum horizontal spacing and minimum rod diameters:
  - 1. NPS 1-1/2 and NPS 2: 60 inches with 3/8-inch rod.
  - 2. NPS 3: 60 inches with 1/2-inch rod.
  - 3. NPS 4 and NPS 5: 60 inches with 5/8-inch rod.
  - 4. NPS 6: 60 inches with 3/4-inch rod.
  - 5. Spacing for 10-foot lengths may be increased to 10 feet. Spacing for fittings is limited to 60 inches.
- F. Install supports for vertical cast-iron soil piping every 15 feet.
- G. Install hangers for steel piping with the following maximum horizontal spacing and minimum rod diameters:
  - 1. NPS 1-1/4: 84 inches with 3/8-inch rod.

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2. NPS 1-1/2: 108 inches with 3/8-inch rod.
  3. NPS 2: 10 feet with 3/8-inch rod.
  4. NPS 2-1/2: 11 feet with 1/2-inch rod.
  5. NPS 3: 12 feet with 1/2-inch rod.
  6. NPS 4 and NPS 5: 12 feet with 5/8-inch rod.
  7. NPS 6: 12 feet with 3/4-inch rod.
- H. Install supports for vertical steel piping every 15 feet.
- I. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:
1. NPS 1-1/4: 72 inches with 3/8-inch rod.
  2. NPS 1-1/2 and NPS 2: 96 inches with 3/8-inch rod.
  3. NPS 2-1/2: 108 inches with 1/2-inch rod.
  4. NPS 3 to NPS 5: 10 feet with 1/2-inch rod.
  5. NPS 6: 10 feet with 5/8-inch rod.
- J. Install supports for vertical copper tubing every 10 feet.
- K. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.5 CONNECTIONS

- A. Connect soil and waste piping to exterior sanitary sewerage piping. Use transition fitting to join dissimilar piping materials.
- B. Connect drainage and vent piping to the following:
1. Plumbing Specialties: Connect drainage and vent piping in sizes indicated, but not smaller than required by plumbing code. Refer to Section 22 13 19 – Sanitary Waste and Vent Piping Specialties.
  2. Equipment: Connect drainage piping as indicated. Provide shutoff valve, if indicated, and union for each connection.

3.6 FIELD QUALITY CONTROL

- A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.
1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
  2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.
- B. Re-inspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for re-inspection.

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- C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.
- D. Test sanitary drainage and vent piping according to procedures of authorities having jurisdiction.
  - 1. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
  - 2. Prepare reports for tests and required corrective action.

3.7 CLEANING

- A. Clean interior of piping. Remove dirt and debris as work progresses.
- B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.
- C. Place plugs in ends of uncompleted piping at end of day and when work stops.

END OF SECTION 221316

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SECTION 221319 - SANITARY WASTE AND VENT PIPING SPECIALTIES

PART 1 – GENERAL

1.1 SUMMARY

- A. This Section includes the following drainage piping specialties:
1. Floor drains/Floor sink.
  2. Miscellaneous drainage piping specialties.
  3. Cleanouts.
  4. Air-gap Fittings.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, and accessories.

1.3 QUALITY ASSURANCE

- A. Drainage piping specialties shall bear label, stamp, or other markings of specified testing agency.

PART 2 – PRODUCTS

2.1 FLOOR DRAINS/FLOOR SINKS

- A. Cast-Iron Floor Drains:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
    - b. Zurn Plumbing Products Group.
    - c. MIFAB
    - d. Sioux Chief
  2. Standard: ASME A112.6.3.
  3. Body Material: Gray iron.
  4. Seepage Flange: Required.
  5. Clamping Device: Required.
  6. Outlet: Bottom.
  7. Top or Strainer Material: Nickel bronze.
  8. Top of Body and Strainer Finish: Polished bronze or Rough bronze as indicated.
  9. Top Shape: Round or Square.
  10. Funnel: See Drawing Schedule.

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11. Inlet Fitting: Gray iron, with threaded inlet and threaded or spigot outlet, and trap-seal primer valve connection.
12. Floor sinks shall be square with grate as specified, see schedule.

2.2 MISCELLANEOUS DRAINAGE PIPING SPECIALTIES

A. Air-Gap Fittings:

1. Standard: ASME A112.1.2, for fitting designed to ensure fixed, positive air gap between installed inlet and outlet piping.
2. Body: Bronze or cast iron.
3. Inlet: Opening in top of body.
4. Outlet: Larger than inlet.
5. Size: Same as connected waste piping and with inlet large enough for associated indirect waste piping.

2.3 CLEANOUTS

- A. General: Cleanouts shall be heavy iron bodies with taper thread-bronze plugs. They shall be full size of the pipe to 4" and not less than 4" for larger pipe. Cleanout extension shall have flush frames and brass removable cover plates. Extension to floor shall be made by using 1/8 bends.

B. Floor Cleanouts

1. Coated cast iron body, heavy duty nickel bronze top, fully adjustable and secured to body. Gasket sealed iron closure plug.
2. Cleanouts installed above grade shall have flange and flashing clamp.
3. Cleanouts in tiled terrazzo or similar paved floors: J.R. Smith #4180.
4. Cleanouts installed in ceramic tile floors: J.R. Smith #4040.
5. Cleanouts installed in floors with asphalt, vinyl or linoleum: J.R. Smith #4140.
6. Cleanouts in carpeted areas shall be furnished with carpet marker: J.R. Smith #4160.
7. Cleanouts in unfinished areas shall have heavy-duty cast-iron covers.
8. All cleanouts shall have vandal-proof screws.
9. Cleanouts in other finished areas shall have round tops.

C. Wall Cleanouts

1. Coated cast iron cleanout tee. Gasket sealed iron plug. Shallow type, round, stainless steel wall cover with center vandal-proof screw.

D. Manufacturers

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. J.R. Smith.
  - b. Sloan.
  - c. Zurn.
  - d. Precision Plumbing Products.



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- e. MIFAB.
- f. Sioux Chief

**PART 3 – EXECUTION**

**3.1 INSTALLATION**

- A. Refer to Section 22 05 00 – Common Work Results for Plumbing, for piping joining materials, joint construction, and basic installation requirements.
- B. Install floor drains at low points of surface areas to be drained. Set grates of drains flush with finished floor, unless otherwise indicated.
  - 1. Position floor drains for easy access and maintenance.
  - 2. Set floor drains below elevation of surrounding finished floor to allow floor drainage. Set with grates depressed according to the following drainage area radii:
    - a. Radius, 30 Inches or Less: Equivalent to 1 percent slope, but not less than 1/4-inch total depression.
    - b. Radius, 30 to 60 Inches: Equivalent to 1 percent slope.
    - c. Radius, 60 Inches or Larger: Equivalent to 1 percent slope, but not greater than 1-inch total depression.
  - 3. Install floor-drain flashing collar or flange so no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes where penetrated.
  - 4. Install individual traps for floor drains connected to sanitary building drain, unless otherwise indicated.
- C. Install floor-drain, trap-seal primer fittings on inlet to floor drains that require trap-seal primer connection.
  - 1. Exception: Fitting may be omitted if trap has trap-seal primer connection.
  - 2. Size: Same as floor drain inlet.
- D. Install air-gap fittings on draining-type backflow preventers and on indirect-waste piping discharge into sanitary drainage system.
- E. Install sleeve flashing device with each riser and stack passing through floors with waterproof membrane.
- F. Install vent caps on each vent pipe passing through roof.
- G. Install traps on plumbing specialty drain outlets. Omit traps on indirect wastes unless trap is indicated.
- H. Install escutcheons at wall, floor, and ceiling penetrations in exposed finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding pipe fittings.
- I. Install cleanouts in above round piping and building drain piping according to the following, unless otherwise indicated:

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1. Size same as drainage piping up to NPS 4. Use NPS 4 for larger drainage piping unless larger cleanout is indicated.
2. Locate at each change in direction of piping greater than 45 degrees.
3. Locate at minimum intervals of 50 feet for piping NPS 4 and smaller and 100 feet for larger piping.
4. Locate at base of each vertical soil and waste stack.

J. For floor cleanouts for piping below floors, install cleanout deck plates with top flush with finished floor.

K. For cleanouts located in concealed piping, install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall.

3.2 CONNECTIONS

A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to equipment to allow service and maintenance.

3.3 PROTECTION

A. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.

B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

END OF SECTION 221319

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SECTION 224000 - PLUMBING FIXTURES

PART 1 – GENERAL

1.1 SUMMARY

- A. This Section includes the plumbing fixtures indicated on the drawings.

1.2 DEFINITIONS

- A. ABS: Acrylonitrile-butadiene-styrene plastic.
- B. Accessible Fixture: Plumbing fixture that can be approached, entered, and used by people with disabilities.
- C. FRP: Fiberglass-reinforced plastic.
- D. PMMA: Polymethyl methacrylate (acrylic) plastic.
- E. PVC: Polyvinyl chloride plastic.
- F. Solid Surface: Nonporous, homogeneous, cast-polymer-plastic material with heat-, impact-, scratch-, and stain-resistance qualities.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Diagram power, signal, and control wiring.
- C. Operation and maintenance data.

1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Regulatory Requirements: Comply with requirements in ICC A117.1, "Accessible and Usable Buildings and Facilities"; Public Law 90-480, "Architectural Barriers Act"; and Public Law 101-336, "Americans with Disabilities Act"; for plumbing fixtures for people with disabilities.
- C. Regulatory Requirements: Comply with requirements in Public Law 102-486, "Energy Policy Act," about water flow and consumption rates for plumbing fixtures.

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- D. NSF Standard: Comply with NSF 61, "Drinking Water System Components--Health Effects," for fixture materials that will be in contact with potable water.
- E. Select combinations of fixtures and trim, faucets, fittings, and other components that are compatible.
- F. ARI Standard: Comply with ARI 1010, "Self-Contained, Mechanically Refrigerated Drinking-Water Coolers," for water coolers and with ARI's "Directory of Certified Drinking Water Coolers" for type and style classifications.
- G. ASHRAE Standard: Comply with ASHRAE 34, "Designation and Safety Classification of Refrigerants" for water coolers. Provide HFC 134a (tetrafluoroethane) refrigerant unless otherwise indicated.
- H. All Plumbing fixtures, associated fittings and trim shall comply with ANSI/NSF 61-8, Annex G and US Senate Bill S.3874 for the wetted surface of all potable water plumbing components as it relates to LEAD-FREE construction.
- I. Comply with the following applicable standards and other requirements specified for plumbing fixtures:
  - 1. Enameled, Cast-Iron Fixtures: ASME A112.19.1M.
  - 2. Plastic Shower Enclosures: ANSI Z124.2.
  - 3. Porcelain-Enameled, Formed-Steel Fixtures: ASME A112.19.4M.
  - 4. Slip-Resistant Bathing Surfaces: ASTM F462.
  - 5. Solid-Surface-Material Lavatories and Sinks: ANSI/ICPA SS-1.
  - 6. Stainless-Steel Residential Sinks: ASME A112.19.3.
  - 7. Vitreous-China Fixtures: ASME A112.19.2M.
  - 8. Water-Closet, Flush Valve, Tank Trim: ASME A112.19.5.
- J. Comply with the following applicable standards and other requirements specified for lavatory and sink faucets:
  - 1. Backflow Protection Devices for Faucets with Side Spray: ASME A112.18.3M.
  - 2. Backflow Protection Devices for Faucets with Hose-Thread Outlet: ASME A112.18.3M.
  - 3. Diverter Valves for Faucets with Hose Spray: ASSE 1025.
  - 4. Faucets: ASME A112.18.1.
  - 5. Hose-Connection Vacuum Breakers: ASSE 1011.
  - 6. Hose-Coupling Threads: ASME B1.20.7.
  - 7. Integral, Atmospheric Vacuum Breakers: ASSE 1001.
  - 8. NSF Potable-Water Materials: NSF 61.
  - 9. Pipe Threads: ASME B1.20.1.
  - 10. Sensor-Actuated Faucets and Electrical Devices: UL 1951.
  - 11. Supply Fittings: ASME A112.18.1.
  - 12. Brass Waste Fittings: ASME A112.18.2.
- K. Comply with the following applicable standards and other requirements specified for bathtub and/or shower faucets:

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1. Backflow Protection Devices for Hand-Held Showers: ASME A112.18.3M.
  2. Combination, Pressure-Equalizing and Thermostatic-Control Antiscald Faucets: ASSE 1016.
  3. Faucets: ASME A112.18.1.
  4. Hand-Held Showers: ASSE 1014.
  5. High-Temperature-Limit Controls for Thermal-Shock-Preventing Devices: ASTM F445.
  6. Hose-Coupling Threads: ASME B1.20.7.
  7. Manual-Control Antiscald Faucets: ASTM F444.
  8. Pipe Threads: ASME B1.20.1.
  9. Pressure-Equalizing-Control Antiscald Faucets: ASTM F444 and ASSE 1016.
  10. Sensor-Actuated Faucets and Electrical Devices: UL 1951.
  11. Thermostatic-Control Antiscald Faucets: ASTM F444 and ASSE 1016.
- L. Comply with the following applicable standards and other requirements specified for miscellaneous fittings:
1. Atmospheric Vacuum Breakers: ASSE 1001.
  2. Brass and Copper Supplies: ASME A112.18.1.
  3. Manual-Operation Flushometers: ASSE 1037.
  4. Plastic Tubular Fittings: ASTM F409.
  5. Brass Waste Fittings: ASME A112.18.2.
  6. Sensor-Operation Flushometers: ASSE 1037 and UL 1951.
- M. Comply with the following applicable standards and other requirements specified for miscellaneous components:
1. Flexible Water Connectors: ASME A112.18.6.
  2. Grab Bars: ASTM F446.
  3. Hose-Coupling Threads: ASME B1.20.7.
  4. Off-Floor Fixture Supports: ASME A112.6.1M.
  5. Pipe Threads: ASME B1.20.1.
  6. Plastic Toilet Seats: ANSI Z124.5.
  7. Supply and Drain Protective Shielding Guards: ICC A117.1.

**PART 2 – PRODUCTS**

**2.1 LAVATORY FAUCETS**

- A. Faucets:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Chicago Faucets.
    - b. T&S Brass
    - c. Sloan
  2. Description: Faucets shall be chrome plated solid brass construction. Metering type as scheduled on the drawings. Faucets for lavatories shall have a maximum flow rate of 0.5 GPM.

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2.2 SINK FAUCETS

A. Faucets:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Chicago Faucets.
  - b. T & S Brass and Bronze Works, Inc.
2. Description: Faucets shall be chrome plated solid brass construction. Type as scheduled on the drawings. Faucets for sinks shall have a maximum flow rate of 2.2 GPM.

2.3 FLUSHOMETERS

A. Flushometers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Sloan Valve Company.
2. Description: Side mounted Flushometer for urinals and water-closet type fixtures. Include brass body with corrosion-resistant internal components, non-hold-open feature, control stop with check valve, vacuum breaker, copper or brass tubing, and polished chrome-plated finish on exposed parts with dual filtered by pass and trap primer connection.
3. Flushometers for water closets to have a consumption rate of 1.28 gallons per flush.
4. Flushometers for urinals to have a consumption rate of .125 gallons per flush.

2.4 TOILET SEATS

A. Toilet Seats:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. American Standard Companies, Inc.
  - b. Bemis Manufacturing Company.
  - c. Church Seats.
  - d. Kohler Co.
  - e. Olsonite Corp.
2. Description: Toilet seat for water-closet-type fixture.
  - a. Material: Molded, solid plastic with antimicrobial agent.
  - b. Configuration: Open front with without cover.
  - c. Size: Elongated.
  - d. Class: Standard commercial.
  - e. Color: White.
  - f. Check hinge

2.5 PROTECTIVE SHIELDING GUARDS

A. Protective Shielding Pipe Covers:

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1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. McGuire Manufacturing Co., Inc.
  - b. TRUEBRO, Inc.
2. Description: Manufactured plastic wraps for covering plumbing fixture hot- and cold-water supplies and trap and drain piping. Comply with Americans with Disabilities Act (ADA) requirements.

2.6 FIXTURE SUPPORTS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  1. Jay R. Smith Mfg. Co.
  2. Zurn Plumbing Products Group
  3. Watts
- B. Water-Closet Supports:
  1. Description: Combination carrier designed for accessible and standard mounting height of wall-mounting, water-closet-type fixture. Include single or double, vertical or horizontal, hub-and-spigot or hubless waste fitting as required for piping arrangement; faceplates; couplings with gaskets; feet; and fixture bolts and hardware matching fixture. Include additional extension coupling, faceplate, and feet for installation in wide pipe space.
- C. Urinal Supports:
  1. Description: Urinal carrier with fixture support plates and coupling with seal and fixture bolts and hardware matching fixture for wall-mounting, urinal-type fixture. Include steel uprights with feet.
  2. Accessible-Fixture Support: Include rectangular steel uprights.
- D. Lavatory Supports:
  1. Description: Type lavatory carrier with concealed arms and tie rod for wall-mounting, lavatory-type fixture. Include steel uprights with feet.
  2. Accessible-Fixture Support: Include rectangular steel uprights.

2.7 WATER CLOSETS

- A. Water Closets:
  1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. American Standard
    - b. Kohler
  2. Description: Accessible, Floor or wall-mounting, back-outlet or wall outlet, vitreous-china fixture designed for operation.
  3. Style:

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- a. Design Consumption: 1.28 gal./flush .
- b. Bowl type: Elongated, include bolt caps matching fixture.
- c. Color: White.

2.8 URINALS

A. Urinals:

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. American Standard Companies, Inc.
  - b. Kohler
- 2. Description: Accessible, wall-mounting, back-outlet, vitreous-china fixture designed for flushometer valve operation.
  - a. Design Consumption: .125 gal./flush
  - b. Color: White.

2.9 LAVATORIES

A. Lavatories:

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. American Standard Companies, Inc.
  - b. Kohler Co.
- 2. Description: Accessible, wall-mounting, vitreous-china fixture.

2.10 SINKS

A. Sinks:

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. American Standard
  - b. Elkay Manufacturing Co.
  - c. Just Manufacturing Company.
- 2. Description: One or Two-bowl, residential, counter-mounting, stainless-steel sink.

2.11 SERVICE SINKS

A. Service Sinks:

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. American Standard Companies, Inc.
  - b. Kohler Co.
  - c. Acorn Engineering Company
  - d. Stern Williams



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2. Description: Trap-standard- and floor-mounting, enameled, cast-iron fixture with roll-rim with back and rim guard on front and sides.

**PART 3 – EXECUTION**

**3.1 INSTALLATION**

- A. Assemble plumbing fixtures, trim, fittings, and other components according to manufacturers' written instructions.
- B. Install off-floor supports, affixed to building substrate, for wall-mounting fixtures.
  1. Use carrier supports with waste fitting and seal for back-outlet fixtures.
  2. Use carrier supports without waste fitting for fixtures with tubular waste piping.
  3. Use chair-type carrier supports with rectangular steel uprights for accessible fixtures.
- C. Install back-outlet, wall-mounting fixtures onto waste fitting seals and attach to supports.
- D. Install floor-mounting fixtures on closet flanges or other attachments to piping or building substrate.
- E. Install wall-mounting fixtures with tubular waste piping attached to supports.
- F. Install fixtures level and plumb according to roughing-in drawings.
- G. Install water-supply piping with stop on each supply to each fixture to be connected to water distribution piping. Attach supplies to supports or substrate within pipe spaces behind fixtures. Install stops in locations where they can be easily reached for operation.
- H. Install trap and tubular waste piping on drain outlet of each fixture to be directly connected to sanitary drainage system. Lavatory and sink traps shall have cleanout.
- I. Install flushometer valves for accessible water closets and urinals with handle mounted on wide side of compartment. Install other actuators in locations that are easy for people with disabilities to reach.
- J. Install toilet seats on water closets.
- K. Install faucet-spout fittings with specified flow rates and patterns in faucet spouts if faucets are not available with required rates and patterns. Include adapters if required.
- L. Install water-supply flow-control fittings with specified flow rates in fixture supplies at stop valves.
- M. Install faucet flow-control fittings with specified flow rates and patterns in faucet spouts if faucets are not available with required rates and patterns. Include adapters if required.
- N. Install shower flow-control fittings with specified maximum flow rates in shower arms.

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- O. Install traps on all fixture outlets.
  - 1. Exception: Omit trap on fixtures with integral traps.
  - 2. Exception: Omit trap on indirect wastes, unless otherwise indicated.
- P. Install escutcheons at piping wall and ceiling penetrations in exposed, finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding fittings. Escutcheons are specified in Section 22 05 00 – Common Work Results for Plumbing.
- Q. Set showers in leveling bed of cement grout. Grout is specified in Division 09, Section “Tiling.”
- R. Seal joints between fixtures and walls, floors, and countertops using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color. Sealants are specified in Division 07, Section "Joint Sealants."

3.2 CONNECTIONS

- A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.
- C. Ground equipment according to Division 26.
- D. Connect wiring according to Division 26.

3.3 FIELD QUALITY CONTROL

- A. Verify that installed plumbing fixtures are categories and types specified for locations where installed.
- B. Check that plumbing fixtures are complete with trim, faucets, fittings, and other specified components.
- C. Inspect installed plumbing fixtures for damage. Replace damaged fixtures and components.
- D. Test installed fixtures after water systems are pressurized for proper operation. Replace malfunctioning fixtures and components, then retest. Repeat procedure until units operate properly.

3.4 PROTECTION

- A. Provide protective covering for installed fixtures and fittings.
  - B. Do not allow use of plumbing fixtures for temporary facilities unless approved in writing by Owner.
- END OF SECTION 224000

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SECTION 230000 – HVAC GENERAL PROVISIONS

PART 1 – GENERAL

1.1 CONDITIONS AND REQUIREMENTS

- A. Refer to BIDDING REQUIREMENTS, CONDITIONS OF THE CONTRACT, and DIVISION 1 of these specifications which govern work under DIVISION 23. Refer to other sections of these specifications for additional related requirements.
- B. Codes, Permits and Fees:
  - 1. Mechanical work shall be in accordance with the most recent adopted publication of the following:
    - a. International Building Code
    - b. International Mechanical Code
    - c. International Fire Code
    - d. National Electric Code
    - e. American Disability Act
    - f. International Energy Conservation Code
    - g. All applicable State and Local Codes and Ordinances.
  - 2. The Contractor shall obtain permits and inspections required for the mechanical work on this project at his expense. Deliver all inspection certificates to the Owner's Representative prior to final acceptance of the work.
  - 3. Contractor(s) shall pay all costs levied by utility companies and/or governing agencies associated with water, gas, sanitary and storm sewer connections and include these costs within his bid. This shall include but not be limited to tap fees, service mains, meters, and vault charges.

1.2 DESCRIPTION OF WORK

- A. The work covered by the contract documents (specifications and construction drawings), shall include but not be limited to:
  - 1. Furnishing all materials and supplying all labor, equipment, and services to install the complete mechanical system as shown on the contract documents and specified herein.
  - 2. All products and materials installed on the project shall be new and in first class condition. Used or resold materials will not be allowed. If requested to verify authenticity of materials the Contractor shall be prepared to produce bill-of-sale invoices.
- B. This project has been designed to meet or exceed the minimum requirements of the governing Codes. The Contractor must notify the Owner's Representative in writing of any items in conflict with the Codes prior to signing the contract, or he shall thereafter make any minor adjustments necessary to meet the Codes at no cost to the Owner.

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- C. The Contractor shall comply with the project close-out requirements as detailed in Division 01, "Closeout Procedures."
- D. Safety Measures:
  - 1. The Contractor shall be solely and completely responsible for conditions of the job site, including safety of all persons and property during performance of the work. This requirement applies continuously and is not limited to normal working hours.
  - 2. Provide all required safety measures and consult with the State or Federal safety inspector for interpretation whenever in doubt as to whether safe conditions do or do not exist.
  - 3. Head protection: Where pipe hangers, equipment support angles, etc., are exposed in access ways for any maintenance, cover all such potentially injurious protrusions less than 7'-0" above the floor with padding; secure and permanently fasten, and finish to match adjacent finishes.

1.3 REFERENCES

A. Definitions

- 1. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.
- 2. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.
- 3. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.
- 4. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in duct shafts.
- 5. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

1.4 QUALITY ASSURANCE

- A. Materials used under this Contract, unless specifically noted otherwise, shall be new and of the latest and most current model line produced by the manufacturer. Each item of equipment shall conform to the latest Standard Specifications of the American Society for Testing Materials and shall conform to any applicable standards of the United States Department of Commerce.
- B. Electrically Driven or Connected Mechanical Equipment:
  - 1. All electrically driven or connected equipment and associated control panels shall be provided with UL or equivalent label and/or listing in accordance with the requirements of the NEC. Equipment shall be listed as an assembly where listing/labeling program is available for that type of equipment.
  - 2. Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and

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conduit sizes are appropriately modified. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

3. All HVAC equipment provided in Division 23 requiring compliance with NEC Article 440 "Air-Conditioning and Refrigerating Equipment" shall be listed for a minimum short-circuit current (AIC) rating of 10,000 Amperes RMS. This equipment shall be listed under UL 1995 for both circuit breakers and fuses as the upstream overcurrent protective device. The nameplate shall read "Maximum overcurrent protective device" not "Maximum Fuse" or "Maximum Circuit Breaker."
  4. All Division 23 equipment other than that provided in 2 above shall be listed or rated for a minimum of 10,000 AIC at 240, 208 or 120 volts and 14,000 AIC at 480 or 277 volts unless a higher value is specifically indicated on the drawings or in the specific equipment specifications.
- C. AWS states that welding qualifications remain in effect indefinitely unless welding personnel have not welded for more than six months or there is a specific reason to question their ability.
- D. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."

1.5 COORDINATION

- A. Consider architectural and structural drawings part of this work insofar as these drawings furnish information relating to design and construction of the building and shall take precedence over mechanical drawings if any dimensional discrepancies exist.
- B. The Contractor shall refer to the architectural and structural details, plans, elevations, and other Contract Drawings and shall coordinate his work with that of the other trades to avoid interference.
- C. Dimensions are approximate and are for estimating purposes only, unless noted otherwise.
- D. The mechanical drawings are diagrammatic and show general locations of fixtures, equipment, and pipe. Drawings are not to be scaled. Field verify exact size, location, invert, and clearances of existing material and equipment, and advise the Owners Representative of any discrepancies between the field conditions and the Drawings prior to any installation. Contractor shall be responsible for all costs associated with the removal or relocation of systems that have been installed without prior notification of the Owners Representative.
- E. Assume all responsibility for fitting of materials and equipment to other parts of equipment and structure.
- F. Prior to installation of the new Division 23 systems, the Contractor shall coordinate the proposed installation with the Architectural and Structural requirements and all other trades (including HVAC, Plumbing, Fire Protection, Electrical, Ceiling Suspension and Tile systems), and provide reasonable maintenance access requirements. Changes required in work specified in Division 23 caused by neglect to do so shall be made at no cost to Owner.
- G. The Contractor shall be responsible for installation of systems according to the Contract Documents. Anything not clear or in conflict will be explained by making application to Owner's Representative. Should conditions arise where certain changes would be advisable,

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secure approval from Owner's Representative for those changes before proceeding.

- H. Furnish sleeves, inserts, supports, and equipment that are to be integrated into other Divisions of the Work to those involved in sufficient time to be built into construction as the Work proceeds. Locate these items and see that they are properly installed. Expense resulting from improper location or installation of items above shall be borne under Division 23.
- I. Electrical Coordination
  - 1. The electrical characteristics of all mechanical equipment to be furnished on the project shall be cross-checked with the Electrical Drawings, prior to ordering equipment, to confirm correct power supply; horsepower, kW, amps, voltage and phase. Where proposed equipment characteristics do not agree with the Electrical Drawings, the engineer shall be contacted for direction before proceeding.
  - 2. Electrical connection sizes: coordinate with the Electrical Drawings for proper electrical lug size and quantity on large capacity devices such as chillers, electric heaters, etc. and determine if the connections will accept either copper or aluminum conductors. Make necessary adjustments to equipment connections to accommodate electrical power feeder sizes and types.
  - 3. Disconnect Switches: Where disconnect switches are furnished integral with the equipment, mounting height shall not exceed 7 ft. (to top) above floor or roof level, including allowance for bases on roof curbs.

1.6 SUBMITTALS

- A. Mechanical Cost Breakdown:
  - 1. The Contractor shall furnish the Owner's Representative an itemized breakdown of the mechanical construction cost within 30 days of notice to proceed. This breakdown shall be utilized for pay applications.
  - 2. At a minimum, the cost breakdown shall be as follows:
    - a. Mobilization
    - b. HVAC Material
    - c. HVAC Labor
    - d. Test and Balance
- B. Payment Requests:
  - 1. Payment requests for the following will not be reviewed or approved until shop drawings have been received:
    - a. Materials.
    - b. Equipment.
- C. Submittal Log: Contractor shall prepare a master submittal log tracking spreadsheet for all Division 23 items, to be filled in, updated and furnished with each submittal package. Submittal log shall indicate specification section and sub-paragraph of each item included in the submittal, along with a general description of the item/equipment, manufacturer name, date submitted and a column for returned date, A/E review action (i.e. approved, approved as noted, revise and resubmit or rejected) and re-submittal action required (if any).

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- D. Submit Shop Drawings and Product Data per the requirements of Division 01 Section, “Submittal Procedures.” See individual Division 23 specification sections for additional submittal requirements.
1. Electronic Submittal: Organize electronic files in a similar manner to hard copy binders, with electronic indexing (bookmarks) and/or portfolio format for ease of organizing and navigating for A/E review and comment purposes. Electronic submittals shall be digitally searchable (Ctrl F) – photocopies are not acceptable. **SUBMITTALS NOT PROVIDED IN THIS FORMAT WILL BE REJECTED.**
- E. Shop Drawings: Refer to Section 013300 for specific information regarding the preparation, submittal, and approval of Shop Drawings.
1. Shop drawings, catalog information and material schedules shall be submitted for approval on all materials and equipment prior to ordering. This applies to all specified material and equipment in Division 23.
  2. Shop drawings shall be reviewed, approved, and stamped by Contractor prior to submitting to Owner’s Representative for approval. Submittals without such approval will be returned without review.
  3. Allow for sufficient time for developing shop drawings, processing, and review time so that the installation will not be delayed.
  4. Indicate manufacturer, trade name and model number. **HIGHLIGHT, ENCIRCLE OR OTHERWISE INDICATE ALL DEVIATIONS FROM THE SPECIFIED PRODUCTS OR BASIS-OR-DESIGN EQUIPMENT.** Include copies of applicable brochure or catalogue materials. Indicate sizes, types, model numbers, ratings and capacities being proposed. Only those items being used on the project shall be included in the submittal.
  5. Where choices of options and accessories are available or specified, provide written description of what is to be furnished. If necessary, list page numbers where submitted items are described.
  6. Include dimensional data for roughing in and installation and technical data sufficient to confirm that equipment meets requirements of drawings and specifications.
  7. Include wiring, piping and service connection data, motor sizes complete with voltage ratings and schedules. Upon approval, copies of these diagrams shall be forwarded to pertinent contractors.
  8. Upon approval, copies of these diagrams shall be forwarded to pertinent contractors.
- F. Product Data: Refer to Section 013300 for specific information regarding preparation, collation, labeling and submittal of Product Data.
1. Clearly identify product data submittal with the project name. Submittals containing resubmitted data shall also include a “Re-submittal” label in bold letters on the cover.
  2. Indicate manufacturer, trade name and model number. Include copies of applicable brochure or catalogue material. Indicate sizes, types, model numbers, ratings, capacities and options actually being proposed.
  3. Include dimensional data for roughing in and installation, and technical data sufficient to confirm that equipment meets requirements of drawings and specifications.
  4. Include wiring, piping and service connection data, motor sizes complete with voltage ratings and schedules.
  5. Submit all materials specified in this Division in one pdf binder.
  6. Re-submittals shall include all materials being re-submitted in one binder. Only completed re-submittal including all applicable specification sections will be reviewed.

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- G. If material or equipment is not as specified or submittal is not complete, it will be rejected. Only completed submittal including all applicable specification sections will be reviewed.
- H. Review comments shall not relieve Contractor from responsibility for deviations from Contract Documents unless attention has been called to such deviations in writing at time of submission, nor shall they relieve this Contractor from responsibility for errors in items submitted.

1.7 CLOSEOUT SUBMITTALS

- A. General: Submit documents to the Owner/Owners Representative for approval prior to the building being turned over to the Owner.
- B. Record Documents / As-Builts: Construction documents shall be updated to convey a record of the alterations to the original design. Such updates shall include updated mechanical, electrical and control drawings red-lined, or redrawn if specified, that show all changes to size, type and locations of components, equipment, and assemblies.
- C. Mechanical Operating and Maintenance (O&M) Manuals
  - 1. Refer to Division 01 for additional Closeout Submittal and Operation and Maintenance Data requirements.
  - 2. Contents for the Mechanical O&M Manual are to include the following:
    - a. Title Page: Project Name, Project Number, building name, Architect, Mechanical Engineer, Electrical Engineer, and General Contractor.
    - b. Table of Contents: Complete listing of contents of this O&M Manual. Where multiple volumes are required, provide Master Table of Contents covering all Volumes and place in the front of each volume.
    - c. Part 1: Listing of all Contractors, subcontractors, and suppliers/vendors for all tiers. Information to include: names, addresses, phone numbers, fax numbers and area of work. Also include a copy of the emergency service information required in Division 1.
    - d. Part 2: Copies of all signed general, mechanical and plumbing permits, and inspection reports.
    - e. Part 3: Copies of all manufacturer's warranty and guarantee forms, and any specified special guarantees, fully executed.
    - f. Part 4: Provide a separate sub divider for each applicable Section in Divisions 22 & 23. Tabs are to be identified by specification section title (i.e. Valves for HVAC Piping) and not just specification section number (i.e. Section 23 05 23). For every Section provide the following:
      - 1) Index listing materials and equipment used.
      - 2) List of suppliers with address, phone number and fax number.
      - 3) Catalog cuts, data sheets, engineering calculations, schedules, wiring diagrams and complete parts lists for all products and equipment incorporated into the Project. Literature shall be clearly marked to indicate each specific item. Include copies of approved submittal data as part of this information.
      - 4) Approved submittal drawings (Option to submit Product Data Submittals as separate Volume(s) if contents are large).
      - 5) Manufacturer's printed operating instructions for all equipment including:
        - a) Initial startup procedures and break-in routine.
        - b) Normal operating instructions.



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- c) Regulation, control, stopping and shutdown.
- d) Troubleshooting and emergency instructions.
- e) Seasonal operating instructions.
- 6) Cleaning, lubrication and preventative maintenance instructions.
- 7) Disassembly, repair and reassembly instructions, including alignment and adjustment instructions.
- 8) Sequence of operation for each system.
- g. Part 5: Valve schedule, including location, system and function for each scheduled valve.
- h. Part 6: Filter schedule, including equipment item, filter type and size for each filter used on the Project.
- i. Part 7: Controls system manufacturer and calibration information, including wiring diagrams, shop drawings, schematics, record documents, and control sequence descriptions. Desired or field determined set-points shall be permanently recorded on control drawings at control devices or, for digital control systems, in system programming instructions.
- j. Part 8: Equipment startup records, test records and certifications. Include certification and test results for the disinfection of domestic water piping, and testing of backflow prevention assemblies, pipe pressure testing, duct leak testing and hydronic water treatment flushing and cleaning witness sheets.
- k. Part 9: Testing, Adjusting and Balancing Report.
- l. Part 10: Final Commissioning Report (Option to submit as separate Volume(s) if contents are large).
- m. Part 11: Spare parts and maintenance materials list. Provide summarized list of spare parts that are to be furnished to the Owner.
- n. Part 12: Owner training sign-off sheets.

1.8 PRODUCT DELIVERY, STORAGE AND HANDLING:

- A. Refer to Division 01 requirements for product storage and handling.
- B. Follow manufacturer's directions in delivery, storage, protection, and installation of equipment and materials.
- C. Promptly notify Owner's Representative in writing of conflicts between requirements of Contract Documents and Manufacturer's directions and obtain written instructions from Owner's Representative before proceeding with work. Contractor shall bear expenses of correcting deficiencies of work that does not comply with manufacturer's directions or such written instructions from Owner's Representative.
- D. Deliver equipment and material to site and tightly cover and protect against dirt, water, and chemical or mechanical injury but have readily accessible for inspection. Store items subject to moisture damage in a dry, heated space.
- E. Special Storage Requirements:
  - 1. Equipment and products to be stored on the project site either outside or inside but unheated spaces shall be provided with shrink-wrapped coverings and shall be additionally provided with chemical desiccant packs to control any stray moisture that may enter the protective wrapping.

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2. Ductwork shall be stored on pallets on grade. Ductwork and air handling equipment shall be kept dry. Air handling equipment that has been allowed to become wet may be rejected.

F. New Equipment and Ductwork Protection:

1. Protect equipment and materials in storage on site, during and after installation until final acceptance. Leave factory covers in place and take special precautions to prevent entry of foreign material into working parts of piping and duct systems.
2. Protect equipment with polyethylene covers and crates.
3. Operate, drain and flush bearings and refill with change of lubricant before final acceptance.
4. Protect bearings and shafts during installation. Grease shafts and sheaves to prevent corrosion. Provide extended nipples for lubrication.
5. During construction, provide temporary closures of metal or taped polyethylene at all openings in new ductwork to prevent construction dust from entering existing ductwork system.
6. RA Grille Filters: Prior to the completion of all dirt and dust producing activities, cover all return intake grilles and openings with temporary MERV 8 filter media. Replace filters at Substantial Completion.

G. Notify Owner of equipment delivery dates 24 hours in advance of delivery.

H. The Contractor shall be responsible for protection of equipment furnished in this Division from vandalism and weather during all phases of construction. Damaged equipment shall be restored to like new condition or replaced at the Contractor's expense.

I. Any factory painted equipment scratched or marred during shipment or construction shall be restored to original "new" condition. This includes complete repainting if necessary to provide exact paint match.

1.9 FIELD CONDITIONS

A. Existing Utilities and Piping:

1. The locations of existing concealed lines and connection points have been indicated as closely as possible from available information. The Contractor shall assume that such connection points are within a Ten foot (10') radius of the indicated location. Where connection points are not within this radius, the Contractor shall contact the Owner's Representative for a decision before proceeding or may proceed at his own expense.
2. Connection points to existing work shall be located and verified prior to starting new work.
3. Prior to commencing any excavation or ditching activity, the Contractor shall verify the exact location and inverts of all existing utilities and connection points in the area of his proposed excavation. Notify Owner's representative for further direction if actual inverts will not allow the proper installation of new work.
4. The Contractor shall be responsible for damages, which might be caused by his failure to exactly locate and preserve underground utilities.

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- B. Existing Hazardous Materials: Refer to Division 00 for information, instructions, and requirements regarding existing potentially hazardous materials including, but no limited to, asbestos and lead.

1.10 WARRANTY

- A. The Mechanical equipment and installation shall be warranted for a period of one (1) year from the date of acceptance unless an individual item or specification is otherwise noted as longer. The Contractor shall make good, at his own expense, all defects in work and/or furnished equipment which develop at any time during the warranty period and shall bare all expenses including that of cutting and patching.
- B. Refer to individual Division 23 specification sections for warranties required to extend beyond the 1-year project warranty period.

1.11 TEMPORARY HEATING, COOLING OR VENTILATION

- A. Temporary heating, cooling or ventilation for the facility during the construction phase shall not be supplied by the permanent system installed under Division 23.
- B. Exceptions:
  - 1. Contractor shall obtain letter of approval from the Owner stating that they understand equipment expected life may be shortened due to severe usage.
  - 2. Product warranties shall be extended to account for construction use. Contractor shall furnish certified document stating such extended warranties.
  - 3. Contractor shall be responsible for pressure cleaning all coils and vacuum cleaning all ductwork prior to occupancy.
  - 4. If Contractor is given permission to use permanent systems for space heating, cooling or ventilation filters shall be installed equal to Farr 30/30. Check and change filters at intervals sufficient to protect the mechanical system. Units shall not be operated without filters in place. New filters shall be installed prior to system balancing.
  - 5. Prior to the completion of all dirt and dust producing activities, cover all return intake grilles and openings with temporary filter media. Replace filters at Substantial Completion.

PART 2 – PRODUCTS

2.1 SUBSTITUTIONS

- A. Refer to Division 01 Substitution Procedures regarding product prior approval and substitution requirements.
- B. Throughout these specifications and drawings, various materials, equipment, apparatus, etc., are specified or scheduled by manufacturer, brand name, type or catalog number. Such designation is to establish standards of desired quality and construction and shall be the basis of design and

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the bid.

- C. Substitutions will not be permitted without written approval.
- D. Where two or more manufacturer designations are listed in these specifications, choice will be Contractor's option.
  - 1. Exception: Where more than one manufacturer is listed, and only one manufacturer's catalog number is specified or only one manufacturer is scheduled on the drawings (basis of design), that standard of quality, dimensional characteristics, capacities, and construction shall be maintained by materials or equipment supplied by the other manufacturer(s).
- E. If the Contractor uses manufacturers other than the basis of design, the Contractor shall be responsible for:
  - 1. Ensuring the substituted item will perform identical to the basis-of-design equipment, fit in the available space while allowing proper maintenance access. In the event other than specified equipment is used and will not fit job site conditions, the Contractor assumes responsibility for replacement with items indicated as the basis of design.
  - 2. Any changes required by other Contractors caused by the substituted equipment, such as different electrical characteristics, control point requirements, etc.
  - 3. Changes in structural design and/or construction due to weight differences.
- F. Products furnished other than the basis of design shall have similar electrical characteristics as the scheduled or specified equipment. Contractor shall be responsible for any electrical changes caused by products not in accordance with this requirement.

**2.2 ELECTRICAL MOTORS**

- A. All electrical motors furnished on the project, whether provided with factory packaged equipment such as pumps, fans, air handlers, fan coil units, etc., or provided separately for field mounting, shall meet or exceed the minimum energy efficiency requirements of Washington State Energy Code, 2012 - Table 10.8, or ASHRAE 90.1 - 2010, Tables 10.8A/B/C, whichever is more stringent.
- B. Motors used with Variable Frequency Drives (VFDs): Motors shall be Premium efficiency type NEMA MG 1 Part 31 compliant, Class F insulation, rated as "Inverter Duty".
- C. ECM (Electrically Commutated Motor) type single-phase motors utilized on direct drive applications, shall be ultra-high efficiency type with programmable brushless DC motor, utilizing a permanent magnet rotor and built-in inverter. Permanently lubricated ball bearing design. Provide with integral microprocessor controller for variable speed control (constant torque or external input variable speed control) as indicated.

**2.3 SLEEVES**

- A. Galvanized-Steel Sheet: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.

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- B. Steel Pipe: ASTM A53, Type E, Grade B, Schedule 40, galvanized, plain ends.
- C. Cast Iron: Cast or fabricated “wall pipe” equivalent to ductile-iron pressure pipe, with plain ends and integral water-stop, unless otherwise noted.
- D. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.
  - 1. Underdeck Clamp: Clamping ring with set screws.
- E. Molded PVC: Permanent, with nailing flange for attaching to wooden forms.
- F. PVC Pipe: ASTM D1785, Schedule 40.
- G. Molded PE: Reusable, PE, tapered-cup shaped and smooth-outer surface with nailing flange for attaching to wooden forms.

2.4 MECHANICAL SLEEVE SEALS

- A. Acceptable Products: Subject to compliance with requirements, provide the following products or approved equal:
  - 1. Link seal by GPT Industries.
- B. Description: Modular sealing element unit, designed for field assembly, to fill annular space between pipe and sleeve.
- C. Sealing Elements: EPDM interlocking links shaped to fit surface of pipe and fiberglass duct. Include type and number required for pipe material and size of pipe.
- D. Pressure Plates: Stainless steel. Include two for each sealing element.
- E. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.5 ESCUTCHEONS

- A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.
- B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with polished chrome-plated finish.
- C. One-Piece, Cast-Brass Type: With set screw.
  - 1. Finish: Polished chrome-plated.
- D. Split-Casting, Cast-Brass Type: With concealed hinge and set screw.

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1. Finish: Polished chrome-plated.

2.6 GROUT

- A. Description: ASTM C1107, Grade B, non-shrink and nonmetallic, dry hydraulic-cement grout.
  1. Characteristics: Post-hardening, volume-adjusting, non-staining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
  2. Design Mix: 5000-psi, 28-day compressive strength.
  3. Packaging: Premixed and factory packaged.

2.7 ACCESS DOORS

- A. Access doors to match surrounding surface, provided with recess to accept matching finish in accordance with the requirements of Division 08. Provide UL rated doors in fire rated construction.
- B. Provide flush type steel framed panel with concealed hinges, size minimum 24 x 25 inch for man access and minimum 18 x 18 inch for inspection and hand access.
- C. Provide cam type locking device with hand or key lock when located in public corridors and washrooms complete with master keys.
- D. Provide access doors for maintenance or adjustments purposes for all mechanical system components including valves, volume dampers, fire dampers, fire/smoke dampers, clean outs, traps and controls.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Examine premises and understand the conditions which may affect the execution of work of this Division before submitting proposals for this work.
- B. No allowance for time or money will be considered for any consequence related to failure to examine existing site conditions.

3.2 INTERFACE WITH OTHER WORK – COORDINATION

- A. It is understood that anything not clear or in conflict will be explained by making application to Owner's Representative. Should conditions arise where certain changes would be advisable, secure approval from Owner's Representative for those changes before proceeding with work.
- B. Coordinate with the work of various trades when installing interrelated work. Before installation of mechanical items, make proper provision to avoid interference's. Changes required in work specified in Division 23 caused by neglect to do so shall be made at no cost to

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Owner.

- C. Furnish and install inserts and supports required by Division 23 unless otherwise noted. Furnish sleeves, inserts, supports, and equipment that are an integral part of other Divisions of the Work to those involved in sufficient time to be built into construction as the Work proceeds. Locate these items and see that they are properly installed. Expense resulting from improper location or installation of items above shall be borne under Division 23.

3.3 INSTALLATION

- A. Coordinate Division 23 equipment and systems to the available space, with other trades. The access routes through the construction shall be the Contractor's responsibility.
- B. Drawings are diagrammatic. Make offsets, transitions, and changes in direction of pipes and ducts, as required to maintain proper headroom and pitch of sloping lines and avoid structural, electrical, pipe and duct interference's whether or not indicated on Drawings. Furnish fittings, etc., as required to make these offsets, transitions and changes in direction at no additional cost to the Owner.
- C. Determine exact route and location of each pipe and duct and coordinate and obtain approval for changes from the layout indicated on the drawings with the Owner's Representative prior to fabrication.
- D. Locations of equipment and devices, as shown on the drawings, are approximate unless dimensioned. Verify the physical dimensions of each item of mechanical equipment to fit the available space and promptly notify the Owner's Representative prior to roughing-in if conflicts appear.
- E. All piping, wiring, equipment, ductwork, tubing, etc., shall be concealed within building construction unless otherwise noted, or in mechanical rooms.
- F. Arrange pipes, ducts, and equipment to permit ready access to valves, unions, traps, trap primers, starters, motors, control components, and to clear openings of doors and access panels.
- G. Prior to installation of the new Division 23 systems, the Contractor shall coordinate the proposed installation with the Architectural and Structural requirements, and all other trades (including HVAC, Plumbing, Fire Protection, Electrical, Ceiling Suspension and Tile systems), and provide reasonable maintenance access requirements.
- H. Provide means of access to all valves, dampers, controllers, operable devices and other apparatus which may require adjustment or servicing.
- I. Verify in field exact size, location, invert, and clearances regarding all existing material, equipment and apparatus, and advise the Owners Representative of any discrepancies between that indicated on the Drawings and that existing in the field prior to any installation. Contractor shall be responsible for all costs associated with the removal or relocation of installed systems that have been installed without prior notification of the Owners Representative.
- J. Equipment Installation – Common Requirements:

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1. Install equipment in accordance with the manufacturer's instructions. Where the construction documents appear to conflict with the manufacturer's instructions, contact the A/E for direction before proceeding with installation. Rework caused as a result of failing to resolve conflicting information beforehand shall be done at no additional cost to the Owner.
2. Install equipment to allow maximum possible headroom unless specific mounting heights are indicated.
3. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.
4. Install mechanical equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting with minimum interference to other installations. Extend grease fittings to accessible locations.
5. Install equipment to allow for piping to be installed at required slope.
6. Motor and equipment name plates as well as applicable UL and AGA labels shall be in place when the Project is turned over to the Owner.

**K. Erection of Metal Supports and Anchorages:**

1. Refer to Division 05 Section "Metal Fabrications" for structural steel fabrication requirements.
2. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor mechanical materials and equipment.
3. Field Welding: Comply with AWS D1.1.

**L. Grouting:**

1. Mix and install grout for mechanical equipment base bearing surfaces, pump and other equipment base plates, and anchors.
2. Clean surfaces that will come into contact with grout.
3. Provide forms as required for placement of grout.
4. Avoid air entrapment during placement of grout.
5. Place grout, completely filling equipment bases.
6. Place grout on concrete bases and provide smooth bearing surface for equipment.
7. Place grout around anchors.
8. Cure placed grout.

**M. Access Openings for Valves, Dampers, Etc.**

1. Provide access doors wherever required to service valves, dampers, fire dampers, motors or any other concealed items requiring access, unless specifically indicated on the drawings to be furnished under other Divisions (i.e., architectural). Access doors for fire dampers shall be installed in duct adjacent to fire damper. Equipment which is accessible by means of removable ceiling panels or tile does not require access doors or panels. Access doors and panels for service and maintenance of items shall be sized and located to allow adequate access for required service.

**N. Fire Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Refer to Division 07 for penetration fire-stopping for materials.**

**O. Switchgear/Electrical Equipment Drip Protection:**



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1. Every effort shall be made to eliminate the installation of pipe above electrical and telephone switchgear. If this is not possible, encase pipe in a second pipe with a minimum amount of joints.
2. Installation of piping, ductwork, leak protection apparatus or other installations foreign to the electrical installation shall be located in the space equal to the width and depth of the equipment and extending to a height of 1.8 m (6 ft.) above the equipment to ceiling structure, whichever is lower (NFPA 70).

**P. Inaccessible Equipment:**

1. Where the A/E determines that the Contractor has installed equipment not conveniently accessible for operation and maintenance, equipment shall be removed and reinstalled or remedial action performed as directed at no additional cost to the Owner.
2. The term “conveniently accessible” is defined as capable of being reached without the use of ladders, or without climbing or crawling under or over obstacles such as motors, fans, pumps, belt guards, transformers, high voltage lines, piping, and ductwork.

**Q. Cutting and Patching:**

1. Perform all cutting and patching of new and existing construction required for the installation of systems and equipment specified in Division 23. All cutting shall be accomplished with masonry saws, drills or similar equipment to provide neat uniform openings. Field verify locations for new openings to avoid conflict with new or existing structure, architectural elements or other utilities. Coordinate penetration locations.
2. Patch and repair walls, floors, ceilings and roof with materials of same quality and appearance as adjacent surfaces unless otherwise shown. Surface finishes shall exactly match existing finishes of same materials. All patching shall meet the approval of the Owner’s Representative. Where existing mechanical systems are removed and roof or wall openings are not to be reused for new systems, the Division 23 Contractor shall be responsible for in-filling the abandoned opening per above.
3. All cutting and patching made necessary by defective equipment, defective workmanship or failure of this Contractor to properly anticipate his requirements shall be included.
4. Cut carefully to minimize necessity for repairs to existing work. Do not cut beams, columns, or trusses or other structural members without the Owner Representative’s written approval.
5. Cutting, patching, repairing, and replacing pavement, sidewalks, roads, and curbs to permit installation of work specified or indicated under this Division is included.

**R. Demolition and Salvage:**

1. Refer to Division 01 for cutting, patching, waste management and disposal, recycling, reuse and documentation requirements.
2. Comply with all Local, State and EPA requirements for glycol antifreeze and/or refrigerant disposal and/or reclaim.
  - a. Where existing refrigeration systems are disturbed by the demolition or new work, the existing refrigerant gas charge shall not be vented to the atmosphere but shall be captured and reclaimed/reused (if in good condition) or disposed of in a safe and legal manner.
  - b. Where existing glycol anti-freeze hydronic systems are impacted by the work, the existing anti-freeze glycol-water solutions shall be either captured and stored for reuse, or disposed of in a safe and legal manner. Refill systems with same level of glycol protection as original (or as specified new).

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3. Demolition of mechanical systems and equipment in remodeled areas shall be provided under Division 23.
4. Disconnect, demolish, and remove HVAC systems, equipment, and components indicated to be removed.
  - a. Ducts to be removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
  - b. Equipment to be removed: Disconnect and cap services and remove equipment.
  - c. Equipment to be removed and reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
  - d. Equipment to be removed and salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
5. If pipe, insulation, or equipment to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.
6. Where the plans are not clear on what existing systems are to remain and be reused or retained for later upgrades, the Contractor shall contact the Owner's Representative for direction before proceeding with demolition work.
7. Systems, materials and equipment designated for demolition, shall be salvaged to the Contractor and removed from the site unless otherwise noted.
8. Equipment and materials salvaged to the Owner shall be delivered to an owner approved on-site location.
9. Contractor shall repair any existing equipment damaged as a result of his work.
10. Verify and document condition of existing systems to be connected to prior to construction.
  - a. Submit to A/E a list of required equipment repairs due to existing conditions.
  - b. Required repairs not documented will be made by the Contractor at his own expense.
11. Contractor's bid shall include re-claim and disposal of refrigerant from existing systems indicated to be removed.

3.4 EQUIPMENT TESTING

- A. Equipment Tests: Equipment shall be subject to tests as specified in individual Division 23 specification sections.
- B. Demonstrate that the mechanical equipment and systems are performing to provide conditions through all possible modes of operation as outlined below. The verification testing procedures shall address all operating characteristics of all mechanical equipment and systems. Equipment and systems shall be tested in accordance with the manufacturer's requirements and the Commissioning testing requirements.
- C. Provide all test equipment, including test pumps, gauges, instruments, and other equipment required. Test all rotational equipment for proper direction of rotation. Upon completion of testing, certify to the Owner's Representative in writing, or as witnessed by the Commissioning Authority, that the specified tests have been performed and that the installation complies with the specified requirements.

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1. Provide equipment start-up test reports on forms provided by the manufacturers, filled-in, dated and signed by the authorized start-up agent or technician. Include copies of start-up reports in the O&M manuals.
- D. A record shall be kept to record each test and copies shall be sent to the Owner's Representative after each test is complete.

**3.5 CLOSEOUT ACTIVITIE**

- A. Demonstration and Owner Training: Instruct the designated Owners representative(s) in operation and maintenance of mechanical systems utilizing the information and material available in the Operation and Maintenance Manual.
- B. Owner Acceptance, Hand-off, Operational & Maintenance Responsibilities & Warranty:
  1. Refer to the General Conditions and Division 01 for the definitions or and additional requirements associated with "Prior Occupancy", "Substantial Completion", "Correction on Nonconforming Work", "Final Completion" and "Warranty of Construction", and other project close-out, substantial completion and warranty requirements.
- C. Punch List Procedures:
  1. Refer to Division 01 Closeout Procedures for general punch list procedures.
  2. The project shall be fully cleaned and, in all respects, ready to turn over to the Owner for occupancy before the Punch List Inspection is requested. This shall include but not be limited to:
    - a. Cleaning up all equipment, materials, cartons, and other debris that is a direct result of the installation of equipment under this contract.
    - b. Cleaning exposed piping, ductwork, equipment, and fixtures.
    - c. Repairing damaged finishes.
  3. The Contractor shall notify the Owner's Representative in writing when the project or phase is ready for punch lists. After punch lists are complete, written notice must be forwarded to the Owner's Representative requesting final checkout.
  4. At the time of final observation, the contractor shall accompany the observation party and shall remove access panels as required, to allow complete observation of the entire mechanical system.

END OF SECTION 230000

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SECTION 230529 - HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 – GENERAL

1.1 SUMMARY

- A. This Section includes the following:
  - 1. Metal framing systems and cross-supports.
  - 2. Fastener systems.
  - 3. Equipment supports.
- B. See Division 5 Section "Metal Fabrications" for structural-steel shapes and plates for trapeze hangers for pipe and equipment supports.
- C. See Section 23 05 48 - Mechanical Vibration Controls for vibration isolation devices.
- D. See Section 23 31 00 - HVAC Ducts for duct hangers and supports.

1.2 REFERENCES

- A. Definitions:
  - 1. Terminology: As defined in MSS SP-90, "Guidelines on Terminology for Pipe Hangers and Supports."
- B. Reference Standards:
  - 1. ASTM International:
    - a. ASTM A36 – Standard Specification for Carbon Structural Steel.
    - b. ASTM A780 – Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
    - c. ASTM C552 – Standard Specification for Cellular Glass Thermal Insulation.
  - 2. American Welding Society (AWS) D1.1 – Structural Welding Code – Steel.

1.3 SUBMITTALS

- A. Product Data: For the following:
  - 1. Metal framing systems and cross-supports.
  - 2. Fastener systems.
  - 3. Equipment supports.
- B. Shop Drawings: Show fabrication and installation details and include calculations for the following:
  - 1. Metal framing systems and cross-supports.

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2. Fastener systems.
3. Equipment supports.

**PART 2 – PRODUCTS**

**2.1 PERFORMANCE REQUIREMENTS**

- A. Contractor shall be responsible for determining the weights of the supported piping, equipment and/or ductwork, based on sizes, hanger support spacing and operating loads. All hangers, rods, clevises, cross-support members, etc. shall be sized and located by the Contractor based on these loads and the recommendations of the support product manufacturers or equivalent structural design practices. Adequacy of building structural elements to bare all upper equipment support anchors points shall be the Contractor's responsibility through the information provided on the Architectural and Structural Drawings.
- B. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

**2.2 METAL FRAMING SYSTEMS**

- A. Description: MFMA-3, shop- or field-fabricated support assembly made of steel channels and other components.
- B. Manufacturers:
  1. B-Line Systems, Inc.; a division of Cooper Industries.
  2. ERICO/Michigan Hanger Co.; ERISTRUT Div.
  3. GS Metals Corp.
  4. Power-Strut Div.; Tyco International, Ltd.
  5. Thomas & Betts Corporation.
  6. Tolco Inc.
  7. Unistrut Corp.; Tyco International, Ltd.
- C. Coatings: Manufacturer's standard finish, unless bare metal surfaces are indicated.
- D. Nonmetallic Coatings: Plastic coating, jacket, or liner.

**2.3 FASTENER SYSTEMS**

- A. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.
  1. Manufacturers:
    - a. Aerofix
    - b. Hilti, Inc.
    - c. ITW Ramset/Red Head.
    - d. Masterset Fastening Systems, Inc.

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- e. MKT Fastening, LLC.
  - f. Powers Fasteners.
- B. Mechanical-Expansion Anchors: Insert-wedge-type zinc-coated steel, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.
- 1. Manufacturers:
    - a. B-Line Systems, Inc.; a division of Cooper Industries.
    - b. Empire Industries, Inc.
    - c. Hilti, Inc.
    - d. ITW Ramset/Red Head.
    - e. MKT Fastening, LLC.
    - f. Powers Fasteners.

2.4 EQUIPMENT SUPPORTS

- A. Description: Welded, shop- or field-fabricated equipment support made from structural-steel shapes.

2.5 MISCELLANEOUS MATERIALS

- A. Structural Steel for Cross-Supports and Support Stands: ASTM A36, steel plates, shapes, and bars; black and galvanized.
- B. Grout: ASTM C1107, factory-mixed and -packaged, dry, hydraulic-cement, non-shrink and nonmetallic grout; suitable for interior and exterior applications.
- 1. Properties: Non-staining, noncorrosive, and nongaseous.
  - 2. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 – EXECUTION

3.1 HANGER AND SUPPORT APPLICATIONS

- A. Contractor shall be responsible for determining the weights of the supported piping, equipment and/or ductwork, based on sizes, hanger support spacing and operating loads. All hangers, rods, clevises, cross-support members, etc. shall be sized and located by the Contractor based on these loads and the recommendations of the support product manufacturers or equivalent structural design practices. Adequacy of building structural elements to bare all upper equipment support anchors points shall be the Contractor's responsibility.

3.2 HANGER AND SUPPORT INSTALLATION

- A. Fastener System Installation:
- 1. Install powder-actuated fasteners in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.

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2. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.

B. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.

C. Equipment Support Installation: Fabricate from welded-structural-steel shapes.

3.3 EQUIPMENT SUPPORTS

A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.

B. Provide lateral bracing, to prevent swaying, for equipment supports.

3.4 METAL FABRICATIONS

A. Cut, drill, and fit miscellaneous metal fabrications for hanger cross-support members, and equipment supports.

B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.

C. Field Welding: Comply with AWS D1.1 procedures for shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work, and with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. Finish welds at exposed connections so no roughness shows after finishing and contours of welded surfaces match adjacent contours.

3.5 ADJUSTING

A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments.

3.6 PAINTING

A. Touch Up: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils.

B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A780.

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END OF SECTION 230529



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SECTION 230548 - MECHANICAL VIBRATION CONTROLS

PART 1 – GENERAL

1.1 SUMMARY

- A. This Section includes the following vibration isolation for mechanical equipment:
1. Elastomeric hangers.
  2. Spring hangers.

1.2 PERFORMANCE REQUIREMENTS

- A. Provide vibration isolation on all motor driven equipment, plus connected piping and ductwork.
- B. The following equipment shall be provided with vibration isolators:
1. Inline Exhaust Fans.
- C. Provide minimum static deflection of isolators for equipment as follows, unless noted otherwise:
1. 400 – 600 rpm: 3.5 inch
  2. 601 – 800 rpm: 2 inch
  3. 801 – 900 rpm: 1 inch
  4. 901 – 1500 rpm: 0.5 inch
  5. Over 1500 rpm: 0.2 inch

1.3 SUBMITTALS

- A. Product Data: Include load deflection curves for each vibration isolation device indicated.
- B. Shop Drawings: Include the following:
1. Design Calculations: Calculate requirements for selecting vibration isolators for individual pieces of equipment (unit weight and distribution, isolator type and deflection, isolator weight rating).

PART 2 – PRODUCTS

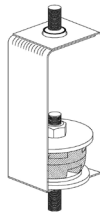
2.1 VIBRATION ISOLATORS

- A. Manufacturers:
1. Amber/Booth Company, Inc.
  2. B-Line Systems, Inc.
  3. California Dynamics Corp.
  4. Isolation Technology, Inc.
  5. Kinetics Noise Control, Inc.
  6. Mason Industries, Inc.
  7. Vibration Eliminator Co., Inc.
  8. Vibration Isolation Co., Inc.
  9. Vibration Mountings & Controls/Korfund.

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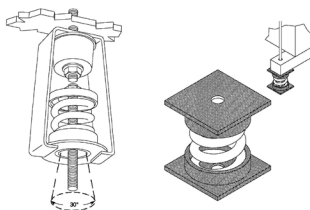
### 10. Vibro-Acoustics

- B. Type EH: Elastomeric Hangers: Double-deflection type, with molded, oil-resistant rubber or neoprene isolator elements bonded to steel housings with threaded connections for hanger rods. Color-code or otherwise identify to indicate capacity range.



ELASTOMERIC HANGER  
EH

- C. Type SH: Spring Hangers: Combination coil-spring and elastomeric-insert hanger with spring and insert in compression.
1. Frame: Steel, fabricated for connection to threaded hanger rods and to allow for a maximum of 30 degrees of angular hanger-rod misalignment without binding or reducing isolation efficiency.
  2. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
  3. Minimum Additional Travel: 50 percent of the required deflection at rated load.
  4. Lateral Stiffness: More than 80 percent of the rated vertical stiffness.
  5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
  6. Elastomeric Element: Molded, oil-resistant rubber or neoprene. Steel-washer-reinforced cup to support spring and bushing projecting through bottom of frame.



SPRING HANGER  
SH

### PART 3 – EXECUTION

#### 3.1 INSTALLATION

- A. Provide in accordance with manufacturer's instructions.
- B. Anchor isolators to equipment and structure.
- C. Connect all associated piping, ductwork and wiring with flexible connectors (unless specifically noted or detailed otherwise).
- D. Install resilient bolt isolation washers on equipment anchor bolts.

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E. Connect wiring to isolated equipment with flexible hanging loop.

3.2 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. Test isolator deflection.
2. Inspect minimum snubber clearances.

3.3 ADJUSTING

- A. Adjust limit stops on restrained spring isolators to mount equipment at normal operating height. After equipment installation is complete, adjust limit stops so they are out of contact during normal operation.
- B. Adjust active height of spring isolators.

3.4 VIBRATION ISOLATOR RESTRAINT SCHEDULE

- A. Refer to Section Mechanical Seismic Controls for seismic restraint requirements for equipment, piping and ductwork.
- B. See plans for additional details and or Vibration Isolator Schedules which shall take precedence over the following default table.

DEFAULT VIBRATION ISOLATOR SCHEDULE												
EQUIPMENT/ SYSTEM	MOUNTING LOCATION	WEIGHT (LBS)	MOUNTING TYPE/ LOCATION			FACTORY INSTALLED INTERNAL VIB. ISOL.	VIBRATION ISOLATOR		SERVICE CONNECTIONS			NOTES
			FLOOR		SUSPENDED		TYPE  See Note 1	STATI C DEFL. (")	FLEXIBLE			
			SLAB	ELEVATED STRUCTURE					DUCT	PIPE	ELECTRICAL	
EXHAUST FAN	SUSPENDE D				X		SH	1"	X		X	
EXHAUST FAN	SUSPENDE D				X		EH	50 Duro	X		X	
Notes: Vibration isolators shall be sized and selected by isolator manufacture based on application, equipment weight and distribution, unit operating speed, mounting configuration, structural span (where applicable).												

END OF SECTION 230548

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SECTION 230553 – IDENTIFICATION FOR HVAC

PART 1 – GENERAL

1.1 SUMMARY

- A. This Section includes the following mechanical identification materials and their installation:
  - 1. Equipment markers.
  - 2. Duct Labels.

1.2 REFERENCES

- A. American Society of Mechanical Engineers (ASME):
  - 1. ASME A13.1 – Scheme for the Identification of Piping Systems.

1.3 SUBMITTALS

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

PART 2 – PRODUCTS

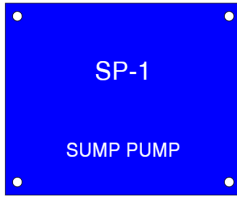
2.1 MANUFACTURERS

- A. Approved label manufacturers.
  - 1. Seton.
  - 2. W. H. Brady.
  - 3. Marking Services Inc.
  - 4. Brimar Industries.

2.2 EQUIPMENT IDENTIFICATION DEVICES

- A. Equipment Markers: 1/16” thick, engraved, color-coded plastic, phenolic or aluminum.
  - 1. Data: Name and equipment tag # listed on schedule.
  - 2. Size: 4 by 6 inches for large equipment, 2 by 3 inches for terminal units. Lettering size proportional.
  - 3. Fasteners: Self-tapping, stainless-steel screws or contact-type, permanent adhesive.

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- B.
  - 1. Tag Colors:
    - a. All heating & cooling devices, Fans, AHUs: Black with White Letters.
- C. Access Panel and Door Markers: Same as equipment markers. Label items or equipment that is access through the door or panel.

**2.3 DUCTWORK LABELS**

- A. Self-Adhesive vinyl markers with air flow directional arrows. Label to identify air handling unit/system and type of air flow, e.g.” HRU-1 Supply Air”, “EF-1 Exhaust Air”, etc.
- B. Label Color Scheme:
  - 1. Supply Air (Tempered Air): Red label with white lettering.
  - 2. Return Air: Yellow label with black lettering.
  - 3. Exhaust Air: Green label with white lettering.
  - 4. Outside Air: Blue label with white lettering.



**PART 3 – EXECUTION**

**3.1 EQUIPMENT IDENTIFICATION**

- A. Install equipment markers with permanent adhesive or screws on or near each major item of mechanical equipment (all equipment scheduled and tagged on the drawings).
  - 1. Data: Name and equipment tag # listed on schedule.
  - 2. Locate markers where accessible and visible. Include markers for the following general categories of equipment:
    - a. Main control and operating valves, including safety devices and hazardous units such as gas outlets.
    - b. Fuel-burning units, including boilers, furnaces, etc.

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- c. Pumps, compressors, chillers, condensers, and similar motor-driven units.
- d. Heat exchangers, coils, evaporators, cooling towers, heat recovery units, and similar equipment.
- e. Fans, blowers, air handlers, fan coils, heat pumps and terminal units.
- f. Packaged HVAC central-station and zone-type units.
- g. Tanks and pressure vessels.
- h. Humidifiers, water-treatment systems, and similar equipment.

3.2 DUCT LABEL INSTALLATION

- A. Install self-adhesive duct labels on all duct systems, including ductwork above lay-in ceilings and inside accessible duct chases. Affix duct label with air flow direction arrows on most visible section of duct. Affix to bare or insulated ductwork as necessary. Clean surfaced before installing labels. Install in the following locations:
  - 1. Near connections to each piece of equipment, inlets and outlets.
  - 2. Near branch take-offs.
  - 3. At wall and floor penetrations. Locate on both sides of penetration.
  - 4. Spaced at a maximum of 25 feet along each duct run. Reduce to intervals of 10 feet in areas of congested ductwork, piping or equipment.

3.3 ADJUSTING AND CLEANING

- A. Relocate mechanical identification materials and devices that have become visually blocked by other work.
- B. Clean faces of mechanical identification devices and frames of valve schedules.

END OF SECTION 230553

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SECTION 230593 - TESTING, ADJUSTING, AND BALANCING (TAB)

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes TAB to produce design flows for exhaust systems.
- B. Reporting results of activities and procedures specified in this Section.

1.2 COORDINATION

- A. Coordinate the efforts of factory-authorized service representatives for systems and equipment, HVAC controls installers, and other mechanics to operate HVAC systems and equipment to support and assist TAB activities.
- B. Perform TAB after leakage and pressure tests on air and water distribution systems have been satisfactorily completed.
- C. Six weeks prior to starting TAB, submit the qualifications of the site technician for the project, including the name of the contractors and facility managers of recent projects the technician on which was lead.
- D. Communicate in writing all set-point and parameter changes made or problems and discrepancies identified during TAB that affect the control system setup and operation.
- E. Provide a draft TAB report within two weeks of completion. The report will contain a full explanation of the methodology, assumptions and the results in a clear format with designations of all uncommon abbreviations and column headings.
  - 1. Provide a list of all components and systems that perform out of specified parameters.
  - 2. Provide any requested data, gathered, but not shown on the draft reports.
- F. Provide a final TAB report for the Owner's Representative with details. Provide final information as requested in draft TAB report.

1.3 SUBMITTALS

- A. Certified TAB Reports: Submit two copies of reports prepared, as specified in this Section, on approved forms certified by TAB firm.

1.4 QUALITY ASSURANCE

- A. TAB Firm Qualifications: An independent testing, adjusting, and balancing agency certified by National Environmental Balancing Bureau (NEBB) in those testing and balancing disciplines specified for this project.

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- B. Prequalified balancing contractors are:
  - 1. Air Commander
  - 2. TestComm
  - 3. Riley Engineering
  
- C. Report Certification: Certify TAB field data reports in accordance with NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems, 5.2.2 Report Certification." This certification includes the following:
  - 1. Review field data reports to validate accuracy of data and to prepare certified TAB reports.
  - 2. Certify that TAB team complied with approved TAB plan and the procedures specified and referenced in this Specification.
  
- D. TAB Report Forms: Use standard forms from NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems."
  
- E. NEBB's Quality Assurance Program (QAP): TAB work shall be performed in accordance with NEBB standards. The certified TAB firm will make application to the NEBB Office for a Certificate of Conformance Certification.

**PART 2 - PRODUCTS (NOT APPLICABLE)**

**PART 3 – EXECUTION**

**3.1 EXAMINATION**

- A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems' designs that may preclude proper TAB of systems and equipment.
  
- B. Examine approved submittal data of HVAC systems and equipment.
  
- C. Examine system and equipment installations to verify that they are complete and that testing, cleaning, adjusting, and commissioning specified in individual Sections have been performed.
  
- D. Examine system and equipment test reports.
  
- E. Examine HVAC system and equipment installations to verify that indicated balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers, are properly installed, and that their locations are accessible and appropriate for effective balancing and for efficient system and equipment operation.
  
- F. Examine systems for functional deficiencies that cannot be corrected by adjusting and balancing.



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- G. Examine HVAC equipment to ensure that clean filters have been installed, bearings are greased, belts are aligned and tight, and equipment with functioning controls are ready for operation.
- H. Examine equipment for installation and for properly operating safety interlocks and controls.
- I. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.
- J. If conditions are discovered that prevent the Testing Agent from performing the test, the Testing Agent shall notify MSI Engineers (509-624-1050) prior to leaving the site.

3.2 PREPARATION

- A. Complete system readiness checks and prepare system readiness reports. Verify the following:
  - 1. Permanent electrical power wiring is complete.
  - 2. Automatic temperature-control systems are operational.
  - 3. Equipment and duct access doors are securely closed.
  - 4. Balance, combination fire & smoke, and fire dampers are open.
  - 5. Ceilings are installed in critical areas where air-pattern adjustments are required and access to balancing devices is provided.
  - 6. Windows and doors can be closed so indicated conditions for system operations can be met.

3.3 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

- A. Perform testing and balancing procedures on each system according to the procedures contained in NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems" and this Section.
  - 1. Where conditions or situations arise that are not covered by the standards, or where system dynamics and performances are not as intended or expected, the Engineer reserves the right to modify the NEBB TAB procedures and standards for the benefit of the final system operation. The balancing agency shall seek guidance from the Engineer when such conditions develop.
- B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary to allow adequate performance of procedures. After testing and balancing, close probe holes and patch insulation with new materials identical to those removed. Restore vapor barrier and finish according to Specifications.
- C. Mark equipment and balancing device settings with paint or other suitable, permanent identification material, including damper-control positions, valve position indicators, fan-speed-control levers, and similar controls and devices, to show final settings.
- D. Perform testing and balancing procedures on each system according to the procedures contained in NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems" and this Section.

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1. Where conditions or situations arise that are not covered by the standards, or where system dynamics and performances are not as intended or expected, the Engineer reserves the right to modify the NEBB TAB procedures and standards for the benefit of the final system operation. The balancing agency shall seek guidance from the Engineer when such conditions develop.
  - E. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary to allow adequate performance of procedures. After testing and balancing, close probe holes and patch insulation with new materials identical to those removed. Restore vapor barrier and finish according to Specifications.
  - F. Mark equipment and balancing device settings with paint or other suitable, permanent identification material, including damper-control positions, valve position indicators, fan-speed-control levers, and similar controls and devices, to show final settings.
  - G. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Crosscheck the summation of required outlet volumes with required fan volumes.
  - H. Prepare schematic diagrams of systems' "as-built" duct layouts.
  - I. Determine the best locations in main and branch ducts for accurate duct airflow measurements.
  - J. Check airflow patterns from the outside-air louvers and dampers and the return- and exhaust-air dampers, through the supply-fan discharge and mixing dampers.
  - K. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.
  - L. Verify that motor starters are equipped with properly sized thermal protection.
  - M. Check dampers for proper position to achieve desired airflow path.
  - N. Check for airflow blockages.
  - O. Check condensate drains for proper connections and functioning.
  - P. Check for proper sealing of air-handling unit components.
  - Q. Check for proper sealing of air duct system.
  - R. Check all fans for proper fan rotation.
- 3.4 PROCEDURES FOR CONSTANT-VOLUME AIR SYSTEMS
- A. Adjust fans to deliver total indicated airflows within the maximum allowable fan speed listed by fan manufacturer.
    1. Measure fan static pressures to determine actual static pressure as follows:
      - a. Measure outlet static pressure as far downstream from the fan as practicable and upstream from restrictions in ducts such as elbows and transitions.

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- b. Measure static pressure directly at the fan outlet or through the flexible connection.
  - c. Measure inlet static pressure of single-inlet fans in the inlet duct as near the fan as possible, upstream from flexible connection and downstream from duct restrictions.
  - d. Measure inlet static pressure of double-inlet fans through the wall of the plenum that houses the fan.
2. Measure static pressure across each component that makes up an air-handling unit, rooftop unit, and other air-handling and -treating equipment.
    - a. Simulate dirty filter operation and record the point at which maintenance personnel must change filters.
  3. Measure static pressures entering and leaving other devices such as sound traps, heat recovery equipment, and air washers, under final balanced conditions.
  4. Compare design data with installed conditions to determine variations in design static pressures versus actual static pressures. Compare actual system effect factors with calculated system effect factors to identify where variations occur. Recommend corrective action to align design and actual conditions.
  5. Obtain approval from Engineer for adjustment of fan speed higher or lower than indicated speed. Make required pulley size changes or adjustments to pulley sizes, and electrical connections to accommodate fan-speed changes.
  6. Do not make fan-speed adjustments that result in motor overload. Consult equipment manufacturers about fan-speed safety factors. Modulate dampers and measure fan-motor amperage to ensure that no overload will occur. Measure amperage in full cooling, full heating, economizer, and any other operating modes to determine the maximum required brake horsepower.
- B. Adjust volume dampers for main duct, submain ducts, and major branch ducts to indicated airflows within specified tolerances.
1. Measure static pressure at a point downstream from the balancing damper and adjust volume dampers until the proper static pressure is achieved.
    - a. Where sufficient space in submain and branch ducts is unavailable for Pitot-tube traverse measurements, measure airflow at terminal outlets and inlets and calculate the total airflow for that zone.
  2. Remeasure each submain and branch duct after all have been adjusted. Continue to adjust submain and branch ducts to indicated airflows within specified tolerances.
- C. Measure terminal outlets and inlets without making adjustments.
1. Measure terminal outlets using a direct-reading hood or outlet manufacturer's written instructions and calculating factors.
- D. Adjust terminal outlets and inlets for each space to indicated airflows within specified tolerances of indicated values. Make adjustments using volume dampers rather than the dampers at air terminals.
1. Adjust each outlet in same room or space to within specified tolerances of indicated quantities without generating noise levels above the limitations prescribed by the Contract Documents.
  2. Adjust patterns of adjustable outlets for proper distribution without drafts.

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- E. Where applicable, adjust counterbalanced relief dampers to maintain a maximum room pressure of .05”w.g. in the economizer mode.

3.5 TEMPERATURE-CONTROL VERIFICATION

- A. Verify wall heaters are actively controlled by their thermostats.

3.6 TOLERANCES

- A. Set HVAC system airflow and water flow rates within the following tolerances:
  - 1. Supply, Return, and Exhaust Fans and Equipment with Fans: Plus or minus 10 percent.
  - 2. Air Outlets and Inlets: Plus or minus 10 percent.
  - 3. Heating-Water Flow Rate: Plus or minus 10 percent.
  - 4. Cooling-Water Flow Rate: Plus or minus 5 percent.

3.7 FINAL REPORT

- A. General: Provide electronic pdf report tabulated and divided into sections by tested and balanced systems.
- B. Include a certification sheet in front of binder signed and sealed by the certified testing and balancing engineer.
  - 1. Include a list of instruments used for procedures, along with proof of calibration.
- C. Final Report Contents: In addition to certified field report data, include the following:
  - 1. Pump curves.
  - 2. Fan curves.
  - 3. Manufacturers' test data.
  - 4. Field test reports prepared by system and equipment installers.
  - 5. Other information relative to equipment performance, but do not include Shop Drawings and Product Data.
- D. General Report Data: In addition to form titles and entries, include the following data in the final report, as applicable:
  - 1. Title page.
  - 2. Name and address of TAB firm.
  - 3. Project name.
  - 4. Project location.
  - 5. Architect's name and address.
  - 6. Engineer's name and address.
  - 7. Contractor's name and address.
  - 8. Report date.
  - 9. Signature of TAB firm who certifies the report.

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10. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
11. Summary of contents including the following:
  - a. Indicated versus final performance.
  - b. Notable characteristics of systems.
  - c. Description of system operation sequence if it varies from the Contract Documents.
12. Nomenclature sheets for each item of equipment.
13. Data for terminal units, including manufacturer, type size, and fittings.
14. Notes to explain why certain final data in the body of reports varies from indicated values.
15. Test conditions for fans and pump performance forms including the following:
  - a. Settings for outside-, return-, and exhaust-air dampers.
  - b. Conditions of filters.
  - c. Cooling coil, wet- and dry-bulb conditions.
  - d. Face and bypass damper settings at coils.
  - e. Fan drive settings including settings and percentage of maximum pitch diameter.
  - f. Settings for supply-air, static-pressure controller.
  - g. Other system operating conditions that affect performance.

END OF SECTION 230593

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SECTION 233100 - HVAC DUCTS

PART 1 – GENERAL

1.1 SUMMARY

A. This Section includes:

1. Metal round, oval, and rectangular ducts and fittings for supply, return, outside, and exhaust air-distribution systems for 1” to 4” W.G. pressure classes.

1.2 REFERENCES

A. ASTM International:

1. ASTM A36 – Standard Specification for Carbon Structural Steel.
2. ASTM A653 – Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc Iron Alloy Coated (Galvannealed) by the Hot Dip Process.
3. ASTM C916 – Standard Specification for Adhesives for Duct Thermal Insulation.
4. ASTM C1071 – Standard Specification for Fibrous Glass Duct Lining Insulation (Thermal and Sound Absorbing Material).
5. ASTM D737 – Standard Test Method for Air Permeability of Textile Fabrics.
6. ASTM D3776 – Standard Test Methods for Mass Per Unit Area (Weight) of Fabric.

B. North American Insulation Manufacturers Association (NAIMA):

1. NAIMA Fibrous Glass Duct Liner Standard

C. NFPA Compliance:

1. NFPA 90A - "Installation of Air Conditioning and Ventilating Systems."
2. NFPA 90B - "Installation of Warm Air Heating and Air Conditioning Systems."

D. Sheet Metal and Air Conditioning Contractors National Association (SMACNA):

1. SMACNA “HVAC Duct Construction Standards – Metal and Flexible”
2. SMACNA “Duct Cleanliness for New Construction”

E. UL Standards:

1. UL 181A-M – Closure Systems for Use with Rigid Air Ducts.

1.3 SUBMITTALS

- A. Product Data: Provide product data on duct materials, sealants and pre-manufactured items, such as duct liner, duct flanges, etc., intended to be used for duct construction.

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- B. Shop Drawings: Show fabrication and installation details for HVAC Ducts.
  - 1. Sheet Metal shop standards for duct construction, pressure classes, reinforcing, hanger sizes, flange construction, etc.
  - 2. Duct liner application and installation details.

1.4 DUCT PRESSURE AND SEALANT CLASS DEFINITIONS

- A. General Sealing Requirements per WA NREC and IMC:
  - 1. Pressure Class up to 3” w.g. – SMACNA Sealant Class B.
  - 2. Pressure Class greater than 3” w.g. – SMACNA Sealant Class A.
- B. General Exhaust duct system serving Exhaust Fans:
  - 1. Pressure Class: 1” W.G.

PART 2 – PRODUCTS

2.1 SHEET METAL MATERIALS

- A. Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods, unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.
- B. Galvanized Sheet Steel: Lock-forming quality; complying with ASTM A653 and having G60 coating designation; ducts shall have mill-phosphatized finish for surfaces exposed to view.
- C. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts.

2.2 SEALANT MATERIALS

- A. Water-Based Joint and Seam Sealant: Flexible, adhesive sealant, resistant to UV light when cured, UL 181A-M listed. Maximum Volatile Organic Content shall be 45 gpl (water excluded) or less. Product shall be equal to Hardcast Versa-Grip 181.

2.3 HANGERS AND SUPPORTS

- A. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.
  - 1. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches thick.
  - 2. Exception: Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches thick.

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- B. Hanger Materials: Galvanized sheet steel or threaded steel rod.
  - 1. Hangers Installed in Corrosive Atmospheres: Electrogalvanized, all-thread rods or galvanized rods with threads painted with zinc-chromate primer after installation.
  - 2. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for steel sheet width and thickness and for steel rod diameters.
- C. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.
- D. Trapeze and Riser Supports: Galvanized-steel shapes and plates complying with ASTM A36.

2.4 DUCT FABRICATION

- A. 1” to 2” W.G. Pressure Class:
  - 1. Material shall be galvanized steel with the following exception:
    - a. Exhaust systems serving kitchen range hood grease exhaust or dishwashers shall be as specified below.
  - 2. Duct sizes shown on drawings are outside nominal dimensions for sheet metal ductwork. Where ductwork is indicated on the drawings to be lined, an allowance for 1” or 2” thick insulation is included, and duct sizes do not need to be increased to compensate for the insulation.
  - 3. Round ducts and fittings: All round ductwork shall be spiral lock seams with spot welded sealed manufactured fittings, galvanized steel.
    - a. Manufacturers:
      - 1) United McGill
      - 2) Ventline.
      - 3) Accu Duct.
  - 4. Round or oval ductwork indicated to be lined shall have a perforated liner and shall be equal to United Sheet Metal Acousti-K27. Unless noted otherwise on the drawings, insulation shall be 1" thick.
  - 5. Rectangular to round branch duct connections shall use spin-in fittings: Spin-in fittings shall be DuroDyne or Air Control Products equal to Air Control Products Model S-SM-C with damper for unlined ductwork or Air Control Products Model S-DB-C with damper for lined ductwork.
  - 6. Rectangular to rectangular branch duct connections shall use 45-degree entry. Straight taps are not allowed.
  - 7. Rectangular Elbows: All 90-degree rectangular elbows shall contain turning vanes. See section 23 33 00 “Duct Accessories” for turning vane fabrication requirements.
  - 8. Round Elbows: All round elbows shall be pleated or segmented with a centerline radius of 1.5 times the cross-section diameter.
  - 9. Fabricate ducts, elbows, transitions, offsets, branch connections, and other construction according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" and complying with requirements for metal thickness, reinforcing types and intervals, tie-rod applications, and joint types and intervals.
    - a. Lengths: Fabricate rectangular ducts in lengths appropriate to reinforcement and rigidity class required for pressure class.
    - b. Deflection: Duct systems shall not exceed deflection limits according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."



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10. Transverse Joints: Prefabricated slide-on joints and components constructed using manufacturer's guidelines for material thickness, reinforcement size and spacing, and joint reinforcement.
  - a. Manufacturers:
    - 1) Ductmate Industries, Inc.
11. Formed-On Flanges: Construct according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible," Figure 1-4, using corner, bolt, cleat, and gasket details.
  - a. Manufacturers:
    - 1) Ductmate Industries, Inc.
    - 2) Lockformer.
12. Cross Breaking or Cross Beading: Cross break or cross bead duct sides 19 inches and larger and 0.0359-inch-thick or less, with more than 10 sq. ft. of nonbraced panel area unless ducts are lined.

2.5 DUCT LINER

- A. Manufacturers:
  1. JM Permacote Linacoustic Mat Faced
  2. CertainTeed
- B. Products meeting ASTM C1071; K(ksi) value of 0.25 (R=4.0 per inch) at 75 degrees F, coated air side for maximum 5,000 ft/min air velocity, 1.5 psf density. Provide EPA registered, anti-microbial agent so that the liner will not support the growth of fungus or bacteria.
- C. Adhesive: UL listed waterproof type.
- D. Fasteners: Duct liner galvanized steel pins, welded or mechanically fastened.
- E. Where ductwork is indicated on the drawings to be lined, an allowance for 1" or 2" thick insulation is included, and duct sizes do not need to be increased to compensate for the insulation.

PART 3 – EXECUTION

3.1 DUCT INSTALLATION

- A. Construct and install ducts according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible," unless otherwise indicated. Ductwork for kitchen grease exhaust duty shall be constructed and installed in accordance with the IMC and NFPA 96.
- B. Install ducts with fewest possible joints.
- C. Take due care to prevent piping, conduit or other building materials from touching ductwork.
- D. Install fabricated fittings for changes in directions, size, and shape and for connections. Use spin-in fittings to connect rigid or flexible round ductwork to rectangular duct for pressure class construction of 2" W.G. or less.

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- E. Install ducts, unless otherwise indicated, vertically and horizontally and parallel and perpendicular to building lines; avoid diagonal runs.
- F. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.
- G. Install ducts with a clearance of 1 inch, plus allowance for insulation thickness.
- H. Conceal ducts from view in finished spaces. Do not encase horizontal runs in solid partitions unless specifically indicated. Ducts exposed to view in finished spaces shall be installed with special attention to workmanship and quality control. Symmetry, alignment and quality of fittings shall be judged by their final appearance and corrected if found to have poor workmanship. Sealant on exposed to view joints shall be applied internally to fittings and wiped clean on exterior of ductwork. Contractor's option on exposed ductwork to utilized gasketed fittings equal to McGill Uni-Gasket Fitting.
- I. Coordinate layout with suspended ceiling, fire- and smoke-control dampers, lighting layouts, and similar finished work.
- J. Seal all joints and seams. Apply sealant to male end connectors before insertion, and afterward to cover entire joint and sheet metal screws.
- K. Electrical Equipment Spaces: Route ducts to avoid passing through transformer vaults and electrical equipment spaces and enclosures.
- L. Non-Fire-Rated Partition Penetrations: Where ducts pass through interior partitions and exterior walls and are exposed to view, conceal spaces between construction openings and ducts or duct insulation with sheet metal flanges of same metal thickness as ducts. Overlap openings on 4 sides by at least 1-1/2 inches.
- M. Protect duct interiors from the elements and foreign materials until building is enclosed. Follow SMACNA's "Duct Cleanliness for New Construction."

3.2 SEAM AND JOINT SEALING

- A. Seal duct seams and joints according to SMACNA's "HVAC Duct Construction Standards-- Metal and Flexible" for duct pressure class indicated.
- B. Seal ducts before external insulation is applied.
- C. Sealant on ducts exposed to view in occupied spaces shall be applied internally to fittings and wiped clean on exterior of ductwork.

3.3 DUCT LINER INSTALLATION

- A. All duct liner shall be installed in accordance with the requirements of the NAIMA Fibrous Glass Duct Liner Standard, or SMACNA HVAC Duct Construction Standard and the project specifications.

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- B. The liner shall be cut and fitted to assure all joints are neatly and tightly butted with no interruptions or gaps. Where ductwork is indicated on the drawings to be lined, an allowance for 1” or 2” thick insulation is included, and duct sizes do not need to be increased to compensate for the insulation.
- C. Where ducts are also specified to be thermally insulated, the duct liner shall be counted towards the total required insulation thickness (i.e. the internal liner thickness may be subtracted from the total duct system insulation thickness otherwise specified).
- D. All duct liner products shall be adhered to the sheet metal ductwork using an adhesive meeting the requirements of ASTM C916. The adhesive film coverage shall be a minimum 90% of the metal surface.
- E. Additionally, secure duct liner with mechanical fasteners at spacing in accordance with NAIMA or SMACNA standards.
- F. All transverse joints shall be edge-coated. Metal nosing on leading or trailing edges is required where lined duct transitions to unlined metal duct.

**3.4 DUCT SUPPORTS**

- A. Duct Supports shall be in accordance with SMACNA’s standards.
- B. Support horizontal ducts within 24 inches of each elbow and within 48 inches of each branch intersection.
- C. Support vertical ducts at maximum intervals of 16 feet and at each floor.
- D. Install upper attachments to structural elements and joists. See structural plans and drawing details for additional limitations and criteria. Do not use eccentric beam clamps on joists. Do not attach duct hangers to bare metal decking (roof decks).
- E. Install concrete inserts before placing concrete.
- F. Install powder-actuated concrete fasteners after concrete is placed and completely cured.
  - 1. Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches thick.

**3.5 DUCTWORK PROTECTION**

- A. During construction provide temporary closures of metal or taped polyethylene at all openings in ductwork to prevent construction dust from entering ductwork system.

**3.6 CONNECTIONS**

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- A. Make connections to equipment with flexible connectors according to Section 23 33 00 - Duct Accessories.
- B. Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

END OF SECTION 233100

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SECTION 233300 - DUCT ACCESSORIES

PART 1 – GENERAL

1.1 SUMMARY

- A. This Section includes the following:
  - 1. Backdraft dampers.
  - 2. Volume dampers.
  - 3. Turning vanes.
  - 4. Flexible connectors.
  - 5. Duct accessory hardware.

1.2 SUBMITTALS

- A. Product Data: For the following:
  - 1. Backdraft dampers.
  - 2. Volume dampers.
  - 3. Turning vanes.
  - 4. Flexible connectors.

1.3 QUALITY ASSURANCE

- A. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," and NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."

PART 2 – PRODUCTS

2.1 SHEET METAL MATERIALS

- A. Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods, unless otherwise indicated.
- B. Galvanized Sheet Steel: Lock-forming quality; complying with ASTM A 653/A 653M and having G60 coating designation; ducts shall have mill-phosphatized finish for surfaces exposed to view.
- C. Stainless Steel: ASTM A 480/A 480M.
- D. Aluminum Sheets: ASTM B 209, alloy 3003, temper H14; with mill finish for concealed ducts and standard, 1-side bright finish for exposed ducts.
- E. Extruded Aluminum: ASTM B 221, alloy 6063, temper T6.

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- F. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.
- G. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.2 NON-MOTORIZED, GRAVITY TYPE, BACKDRAFT DAMPERS

- A. Approved Manufacturers:
  - 1. Air Balance, Inc.
  - 2. American Warming and Ventilating.
  - 3. Ruskin.
  - 4. Prior approved equal.
- B. Application: Non-motorized gravity type backdraft dampers installed in ductwork distribution systems, may only be used for relief air on systems 5,000 cfm or less, in buildings less than three stories in height (WA NREC). Backdraft dampers provided for exhaust air outlets and larger relief air conditions shall be motorized type dampers (provided with the exhaust fans or field mounted). See Section HVAC Controls and Instrumentation for field mounted motorized control and/or shut-off dampers.
- C. Performance: Leakage shall not exceed 20 cfm/sq. ft. at 1.0" w.g. pressure. Dampers shall be suitable for applications up to 2500 fpm velocity.
- D. Description: Factory fabricated, multiple-blade, parallel action gravity type, counter-balanced, with center-pivoted blades of maximum 6-inch width, with sealed edges, assembled in rattle-free manner with 90-degree stop, synthetic bearings, and axles; adjustment device to permit setting for varying differential static pressure.
- E. Frame: 0.125-inch-thick, galvanized sheet steel or extruded aluminum, with welded or jointed corners and mounting flange.
- F. Blades: 0.070-inch-thick aluminum sheet.
- G. Blade Seals: Neoprene or vinyl.
- H. Blade Axles: Galvanized steel or extruded aluminum.
- I. Tie Bars and Brackets: Galvanized steel or aluminum.
- J. Adjustment Device: Adjustable counterweights or adjustable tension spring device.

2.3 MANUAL VOLUME DAMPERS

- A. Approved Manufacturers:
  - 1. Air Balance, Inc.
  - 2. American Warming and Ventilating.

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3. Nailor Industries Inc.
  4. Penn Ventilation Company, Inc.
  5. Ruskin.
- B. Application: Manual, non-motorized, volume dampers shall be installed in distribution ductwork to be used for balancing supply, return and exhaust volumes. For automatic modulating type control dampers for temperature control purposes, refer to Section HVAC Controls and Instrumentation.
- C. Performance: Medium and low pressure duct applications up to 2,000 fpm. Manual volume dampers are not required to have resilient seals unless being applied for shut-off service.
- D. General Description: Factory fabricated, with required hardware and accessories. 3V style stiffened damper blades for stability. Include locking quadrant device to hold damper blades in a fixed position without vibration. Close duct penetrations for damper components to seal duct consistent with pressure class.
- E. Rectangular Volume Dampers: Multiple- or single-blade (9 inch height or less), opposed-blade design, standard leakage rating, with linkage outside airstream, and suitable for horizontal or vertical applications.
1. Steel Frames: Hat-shaped, galvanized sheet steel channels, minimum of 16 gage (0.064 inch thick), with mitered and tabbed or welded corners; frames with face flanges where indicated for attaching directly to walls and box frames where indicated for installing in ducts. Equivalent aluminum framed dampers are acceptable.
  2. Roll-Formed Steel Blades: 16 gage (0.064-inch-thick), 3V style galvanized sheet steel.
  3. Blade Axles: Galvanized steel.
  4. Bearings: Molded synthetic.
  5. Tie Bars and Brackets: Galvanized steel.
  6. Pressure rating: Up to 4" wg at 2000 fpm.
- F. Round and Oval Volume Dampers: Up to 24" diameter, single-blade, galvanized steel, 20 gage (0.04") blade, factory or shop fabricated damper. Provide with galvanized steel square axel, molded nylon bearings, and locking quadrant device.
- G. Round Spin-In Fittings: Sheet metal conical spin-in round branch take-off complete with manual volume damper and locking quadrant. Where rectangular duct sizes do not allow a conical fitting, a straight tap shall be allowed.
- H. Locking Quadrant Air Flow Balancing Device: Provide locking air-flow balancing device on all manual volume dampers. Device shall Rossi model "Everlock" type positive locking damper handle with spring-loading trigger handle with multi-position notches for incremental air flow balancing with positive, vibration proof, setting. Standard wing-nut style locking quadrants are NOT acceptable. Include elevated 1.5" or 2" platform for insulated duct mounting. Where critical infinite air flow adjustment is noted or called for, provide a Rossi Twistknob style locking devices in lieu of the multi-position device.
- I. Volume dampers located above ceilings and in non-accessible locations shall be equipped with Young Regulator Co. Bowden cable and worm gear assembly, with ceiling mounted adjustment assembly and stainless steel cover plate.

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2.4 TURNING VANES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. United McGill
  - 2. Tuttle and Bailey
  - 3. Air Control Products
  - 4. Aero/Dyne.
- B. Fabricate to comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for vanes and vane runners. Vane runners shall automatically align vanes.
- C. Manufactured Turning Vanes: Fabricate single-vane, curved blades of galvanized sheet steel; support with bars perpendicular to blades and set into vane runners suitable for duct mounting.
- D. Turning Vanes in 4" Duct Pressure Class shall be high efficiency type equal to H-E-P as manufactured by Aero/Dyne Co. constructed with 2" long airfoil leading edge and 3" long trailing edge.

2.5 FLEXIBLE CONNECTORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Duro Dyne Corp.
  - 2. Ventfabrics, Inc.
- B. UL listed fire-retardant neoprene coated woven glass fiber fabric and in compliance with NFPA 90A, approximately 3" wide, crimped into metal edging strip. Weight: 30 oz/sq yd.

2.6 DUCT ACCESSORY HARDWARE

- A. Instrument Test Holes: Cast iron or cast aluminum to suit duct material, including screw cap and gasket. Size to allow insertion of pitot tube and other testing instruments and of length to suit duct insulation thickness.
- B. Adhesives: High strength, quick setting, neoprene based, waterproof, and resistant to gasoline and grease.

PART 3 – EXECUTION

3.1 APPLICATION AND INSTALLATION



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- A. Install duct accessories according to applicable details in SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for metal ducts.
- B. Provide duct accessories of materials suited to duct materials; use galvanized-steel accessories in galvanized-steel, stainless-steel accessories in stainless-steel ducts, and aluminum accessories in aluminum ducts.
- C. Install gravity backdraft dampers on relief air duct nearest to outside wall where indicated.
- D. Install manual balancing volume dampers in ducts with acoustic liner in a manner to avoid damage to and erosion of duct liner. Provide edge seals on duct liner before and after damper.
- E. Provide manual balancing volume dampers at points on supply, return, and exhaust systems where branch take-offs lead from larger ducts as required for air balancing. If damper is not a part of a manufactured fitting, install at a minimum of two duct widths from branch takeoff.
- F. Provide manual balancing volume dampers on ALL duct take-off to diffusers, grilles, and registers, regardless of whether or not separate dampers are specified as a part of the diffuser, grille, or register assembly. Locate volume damper closest to take off point, furthest from diffuser, for sound control purposes. Where volume damper locking quadrant assemblies are not accessible or are located above hard ceilings, provide a Young Regulator Co. Bowden Cable Assembly remote regulator.
- G. Provide test holes at fan inlets and outlets and elsewhere as required to balance the system.
- H. Label ductwork according to Division 23 Section "Identification for HVAC."
- I. Install flexible connectors immediately adjacent to equipment in ducts associated with fans and motorized equipment supported by vibration isolators.
- J. Install duct test holes where indicated and required for testing and balancing purposes.

3.2 ADJUSTING

- A. Adjust duct accessories for proper operation. Assure that all dampers rotate smoothly, all access doors are accessible and are easy to open and close. Repair or replace damaged items.
- B. Final positioning of manual-volume dampers is specified in Division 23 Section "Testing, Adjusting, and Balancing."

END OF SECTION 233300

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SECTION 233423 - POWER VENTILATORS

PART 1 – GENERAL

1.1 SUMMARY

- A. This Section includes the following:

1. In-line ventilators.

1.2 SUBMITTALS

- A. Product Data: Include rated capacities, furnished specialties, and accessories for each type of product indicated.
- B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
- C. Field quality-control start-up test reports.
- D. Operation and maintenance data.

1.3 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. NEMA Compliance: Motors and electrical accessories shall comply with NEMA standards.
- C. UL Standard: Power ventilators shall comply with UL 705. Power ventilators for Type I kitchen hood exhaust duty shall comply with UL 762.

1.4 PULLEYS AND BELTS

- A. Allow for the complete replacement, labor and material, of pulleys and belts for all belt driven equipment as may found to be necessary during Testing and Balancing to achieve final design air flows.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

**LEWIS & CLARK TRAIL STATE PARK  
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- A. Approved manufacturers: Unless specifically noted otherwise, the following list of manufacturers are approved to furnish power ventilators.

1. Loren Cook Company .
2. Acme Engineering & Mfg. Corp.
3. Penn Ventilation.
4. Twin City Fan

2.2 EQUIPMENT SCHEDULES

- A. Refer to equipment schedules on the drawings for detailed information regarding unit designations, duty, manufacture, model number, performance, and accessories. Where the unit is specified with a defined manufacturer and model number, the characteristics and features of that specific cataloged unit shall take precedence over those indicated here. When accessories and optional features are listed both on the drawing schedules and in the specifications, they shall be assumed to be all required.

2.3 IN-LINE VENTILATORS

- A. Description: Centrifugal fans designed for installing in-line applications.
- B. Certifications: Fan shall be manufactured at an ISO 9001 certified facility. Fan shall be listed by Underwriters Laboratories (UL 705). Fan shall bear the AMCA Certified Ratings Seal for Sound and Air Performance.
- C. Construction: The fan housing shall be minimum 20 gauge galvanized steel and acoustically insulated. Blower and motor assembly shall be mounted to a minimum 14 gauge reinforcing channel and shall be easily removable from the housing. Motor shall be mounted with vibration isolators. Unit shall be supplied with integral wiring box and disconnect receptacle. Discharge position shall be convertible from right angle to straight through by moving interchangeable panels. The outlet duct collar shall include a reinforced aluminum damper with continuous aluminum hinge rod and brass bushings.
- D. Fan Wheel: Wheel shall be centrifugal forward curve type, constructed of galvanized steel. Wheel shall be based balanced in accordance with AMCA Standard 204-96, Balance Quality and Vibration Levels for Fans.
- E. Motor: Motor shall be open drip proof type with permanently lubricated bearings, built-in thermal overload protection and disconnect plug or ECM motor as indicated on equipment schedule/model number designation.
- F. Electrical Requirements: Junction box for electrical connection on housing and receptacle for motor plug-in.
- G. Accessories:
1. Motorized or gravity backdraft damper as scheduled.
  2. Factory fan speed control switch for direct drive models (factory mounted to unit).
  3. Wall or roof outlets with backdraft dampers.

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**PART 2 – EXECUTION**

**3.1 INSTALLATION**

- A. Install power ventilators and exhausters generally where indicated on the plans. Coordinate location with nearby equipment and building elements.
  - 1. Locate all exhaust outlets a minimum of 10 feet from air intakes or greater as indicated on the drawings.
- B. Install power ventilators level and plumb.
- C. Support suspended In-Line units from structure using threaded steel rods. Vibration-control devices are specified in Division 23 Section "Mechanical Vibration Controls."
- D. Install units with adequate clearances for service and maintenance.
- E. Label units according to requirements specified in Division 23 Section "Identification for HVAC."
- F. Duct installation and connection requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of ducts and duct accessories. Make final duct connections with flexible connectors. Flexible connectors are specified in Division 23 Section "Duct Accessories."
- G. Ducts installed adjacent to power ventilators shall be done in a manner that allows service and maintenance.
- H. Ground equipment according to Division 26.
- I. Connect wiring according to Division 26.

**3.2 FIELD QUALITY CONTROL**

- A. Perform the following field tests and inspections and prepare test reports:
  - 1. Verify that shipping, blocking, and bracing are removed.
  - 2. Verify that unit is secure on mountings and supporting devices and that connections to ducts and electrical components are complete. Verify that proper thermal-overload protection is installed in motors, starters, and disconnect switches.
  - 3. Verify that cleaning and adjusting are complete.
  - 4. Verify lubrication for bearings and other moving parts.
  - 5. Verify that manual and automatic volume control in connected ductwork systems are in fully open position.
  - 6. Remove and replace malfunctioning units and retest as specified above.
- B. Test and adjust controls, safeties and backdraft dampers. Replace damaged and malfunctioning controls and equipment.

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- C. Provide start-up and testing report for each power ventilator.
- D. Make any fan speed adjustments and replace pulleys and belts as directed by the Testing & Balancing Contractor.

END OF SECTION 233423

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SECTION 238238 – ELECTRIC UNIT HEATERS

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes:

1. Electric Wall Heaters.

1.2 SUBMITTALS

- A. Product Data: Include rated capacities, operating characteristics, furnished specialties, and accessories for each product indicated.
- B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
- C. Field quality-control test reports.
- D. Operation and maintenance data.

1.3 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

PART 2 – PRODUCTS

2.1 ELECTRIC WALL HEATERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  1. Indeeco
  2. Berko
  3. Q-Mark
  4. Brasch
- B. Description: Wall mounted electric forced air heater with heavy gauge cabinet, sloped top and decorative grilles.
- C. Cabinet: 16-gauge cabinet with tamper-proof removable panels for maintenance access to controls. Sloped top design.

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- D. Cabinet Finish: Manufacturer's standard baked enamel or powder coated finish. Color selected by Architect.
- E. Discharge Louver: Adjustable blade grille.
- F. Coils: Circular copper clad steel sheathed element with continuously brazed steel fins, or nickel-chromium wire elements enclosed in powder filled aluminum coated steel tubes with spiraled fins. Elements shall be resistant to thermal shock and vibration.
- G. Provide with auto reset over-heat limit controls.
- H. Fan: Multiple direct-drive scroll type fans on a common shaft.
- I. Motor: Permanently lubricated.
- J. Accessories:
  - 1. 4-Speed fan switch.
  - 2. Disconnect switch.
- K. Controls: Provide with integral tamper-proof thermostat.

**PART 3 – EXECUTION**

**3.1 INSTALLATION**

- A. Install unit heaters to comply with NFPA 90A.
- B. Secure wall heaters to wall in accordance with manufacturer's requirements.
- C. Comply with safety requirements in UL 1995.
- D. Ground equipment according to Section 26 05 26 "Grounding and Bonding for Electrical Systems."
- E. Connect wiring according to Division 26.

**3.2 FIELD QUALITY CONTROL**

- A. Perform the following field tests and inspections and prepare test reports:
  - 1. Operate electric heating elements to verify proper operation and electrical connections.
  - 2. Test and adjust controls and safety devices. Replace damaged and malfunctioning controls and equipment.
- B. Remove and replace malfunctioning units and retest as specified above.

END OF SECTION 238238

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SECTION 260519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 SUBMITTALS

- A. Product Data: Provide manufacturer's standard catalog pages and data sheets for conductors and cables, including detailed information on materials, construction, ratings, listings, and available sizes, configurations, and stranding.
- B. Wire Pulling Lubricant: Certification of compatibility with conductors/cables where used with the following insulation/jacket types:

1.2 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.

PART 2 - PRODUCTS

2.1 CONDUCTOR AND CABLE APPLICATIONS

- A. Do not use conductors and cables for applications other than as permitted by NFPA 70 and product listing.
- B. Provide single conductor building wire installed in suitable raceway unless otherwise indicated, permitted, or required.
- C. Nonmetallic-sheathed cable is not permitted.
- D. Underground feeder and branch-circuit cable is not permitted.
- E. Service entrance cable is not permitted.
- F. Armored cable is permitted only as follows:
  - 1. Where not otherwise restricted, may be used:
    - a. Where concealed above accessible ceilings for final connections from junction boxes to luminaires.
      - 1) Maximum Length: 6 feet (1.8 m).
    - b. Where concealed in hollow stud walls, above accessible ceilings, and under raised floors for branch circuits up to 20 A.
      - 1) Exception: Provide single conductor building wire in raceway for circuit homerun from first outlet to panelboard.
  - 2. In addition to other applicable restrictions, may not be used:
    - a. Where not approved for use by the authority having jurisdiction.
    - b. Where exposed to damage.



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- c. For damp, wet, or corrosive locations.
- G. Metal-clad cable is permitted only as follows:
- 1. Where not otherwise restricted, may be used:
    - a. Where concealed above accessible ceilings for final connections from junction boxes to luminaires.
      - 1) Maximum Length: 6 feet (1.8 m).
    - b. Where concealed in hollow stud walls, above accessible ceilings, and under raised floors for branch circuits up to 20 A.
      - 1) Exception: Provide single conductor building wire in raceway for circuit homerun from first outlet to panelboard.
  - 2. In addition to other applicable restrictions, may not be used:
    - a. Where not approved for use by the authority having jurisdiction.
    - b. Where exposed to damage.
    - c. For damp, wet, or corrosive locations, unless provided with a PVC jacket listed as suitable for those locations.

2.2 CONDUCTOR AND CABLE GENERAL REQUIREMENTS

- A. Provide products that comply with requirements of NFPA 70.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, etc. as required for a complete operating system.
- D. Comply with NEMA WC 70.
- E. Thermoplastic-Insulated Conductors and Cables: Listed and labeled as complying with UL 83.
- F. Thermoset-Insulated Conductors and Cables: Listed and labeled as complying with UL 44.
- G. Conductors for Grounding and Bonding: Also comply with Section 260526.
- H. Conductors and Cables Installed Exposed in Spaces Used for Environmental Air (only where specifically permitted): Plenum rated, listed and labeled as suitable for use in return air plenums.
- I. Conductor Material:
  - 1. Provide copper conductors only. Aluminum conductors are not acceptable for this project. Conductor sizes indicated are based on copper.
  - 2. Copper Conductors: Soft drawn annealed, 98 percent conductivity, uncoated copper conductors complying with ASTM B3, ASTM B8, or ASTM B787/B787M unless otherwise indicated.
  - 3. Tinned Copper Conductors: Comply with ASTM B33.
- J. Minimum Conductor Size: 12 AWG.

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- K. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
  
- L. Conductor Color Coding:
  - 1. Color code conductors as indicated unless otherwise required by the authority having jurisdiction. Maintain consistent color coding throughout project.
  - 2. Color Coding Method: Integrally colored insulation.
    - a. Conductors size 4 AWG and larger may have black insulation color coded using vinyl color coding electrical tape.
  - 3. Color Code:
    - a. 240/120 V, 1 Phase, 3 Wire System:
      - 1) Phase A: Black.
      - 2) Phase B: Red.
      - 3) Neutral/Grounded: White.
    - b. Equipment Ground, All Systems: Green.
    - c. For modifications or additions to existing wiring systems, comply with existing color code when existing code complies with NFPA 70 and is approved by the authority having jurisdiction.
    - d. For control circuits, comply with manufacturer's recommended color code.

**2.3 SINGLE CONDUCTOR BUILDING WIRE**

- A. Description: Single conductor insulated wire.
  
- B. Conductor Stranding:
  - 1. Feeders and Branch Circuits:
    - a. Size 10 AWG and Smaller: Solid.
    - b. Size 8 AWG and Larger: Stranded.
  
- C. Insulation Voltage Rating: 600 V.
  
- D. Insulation:
  - 1. Copper Building Wire: Type THHN/THWN or THHN/THWN-2, except as indicated below.
    - a. Installed Underground: Type XHHW-2.

**2.4 ARMORED CABLE**

- A. Description: NFPA 70, Type AC cable listed and labeled as complying with UL 4, and listed for use in classified firestop systems to be used.
  
- B. Conductor Stranding:
  - 1. Size 10 AWG and Smaller: Solid.
  - 2. Size 8 AWG and Larger: Stranded.
  
- C. Insulation Voltage Rating: 600 V.

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- D. Insulation: Type THHN.
- E. Grounding: Combination of interlocking armor and integral bonding wire.
- F. Armor: Steel, interlocked tape.

2.5 METAL-CLAD CABLE

- A. Description: NFPA 70, Type MC cable listed and labeled as complying with UL 1569, and listed for use in classified firestop systems to be used.
- B. Conductor Stranding:
  - 1. Size 10 AWG and Smaller: Solid.
  - 2. Size 8 AWG and Larger: Stranded.
- C. Insulation Voltage Rating: 600 V.
- D. Insulation: Type THHN, THHN/THWN, or THHN/THWN-2.
- E. Grounding: Full-size integral equipment grounding conductor.
- F. Armor: Steel, interlocked tape.
- G. Provide PVC jacket applied over cable armor where indicated or required for environment of installed location.

2.6 WIRING CONNECTORS

- A. Description: Wiring connectors appropriate for the application, suitable for use with the conductors to be connected, and listed as complying with UL 486A-486B or UL 486C as applicable.
- B. Connectors for Grounding and Bonding: Comply with Section 260526.
- C. Wiring Connectors for Splices and Taps:
  - 1. Copper Conductors Size 8 AWG and Smaller: Use twist-on insulated spring connectors.
  - 2. Copper Conductors Size 6 AWG and Larger: Use mechanical connectors or compression connectors.
- D. Wiring Connectors for Terminations:
  - 1. Provide terminal lugs for connecting conductors to equipment furnished with terminations designed for terminal lugs.
  - 2. Provide compression adapters for connecting conductors to equipment furnished with mechanical lugs when only compression connectors are specified.
  - 3. Where over-sized conductors are larger than the equipment terminations can accommodate, provide connectors suitable for reducing to appropriate size, but not less than required for the rating of the overcurrent protective device.

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4. Copper Conductors Size 8 AWG and Larger: Use mechanical connectors or compression connectors where connectors are required.
  5. Aluminum Conductors: Use compression connectors for all connections.
- E. Do not use insulation-piercing or insulation-displacement connectors designed for use with conductors without stripping insulation.
- F. Do not use push-in wire connectors as a substitute for twist-on insulated spring connectors.
- G. Twist-on Insulated Spring Connectors: Rated 600 V, 221 degrees F (105 degrees C) for standard applications and 302 degrees F (150 degrees C) for high temperature applications; pre-filled with sealant and listed as complying with UL 486D for damp and wet locations.
- H. Mechanical Connectors: Provide bolted type or set-screw type.
- I. Compression Connectors: Provide circumferential type or hex type crimp configuration.

## 2.7 ACCESSORIES

- A. Electrical Tape:
1. Vinyl Color Coding Electrical Tape: Integrally colored to match color code indicated; listed as complying with UL 510; minimum thickness of 7 mil (0.18 mm); resistant to abrasion, corrosion, and sunlight; suitable for continuous temperature environment up to 221 degrees F (105 degrees C).
  2. Vinyl Insulating Electrical Tape: Complying with ASTM D3005 and listed as complying with UL 510; minimum thickness of 7 mil (0.18 mm); resistant to abrasion, corrosion, and sunlight; conformable for application down to 0 degrees F (-18 degrees C) and suitable for continuous temperature environment up to 221 degrees F (105 degrees C).
- B. Oxide Inhibiting Compound: Listed; suitable for use with the conductors or cables to be installed.
- C. Wire Pulling Lubricant:
1. Listed and labeled as complying with UL 267.
  2. Suitable for use with conductors/cables and associated insulation/jackets to be installed.
  3. Suitable for use at installation temperature.
- D. Cable Ties: Material and tensile strength rating suitable for application.
- E. Firestop Sleeves: Listed; provide as required to preserve fire resistance rating of building elements.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Circuiting Requirements:

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1. Maintain separation of Class 1, Class 2, and Class 3 remote-control, signaling, and power-limited circuits in accordance with NFPA 70.
  2. Maintain separation of wiring for emergency systems in accordance with NFPA 70.
  3. Common Neutrals: Unless otherwise indicated, sharing of neutral/grounded conductors among up to three single phase branch circuits of different phases installed in the same raceway is not permitted. Provide dedicated neutral/grounded conductor for each individual branch circuit.
- B. Install products in accordance with manufacturer's instructions.
- C. Perform work in accordance with NECA 1 (general workmanship).
- D. Install armored cable (Type AC) in accordance with NECA 120.
- E. Install metal-clad cable (Type MC) in accordance with NECA 120.
- F. Secure and support conductors and cables in accordance with NFPA 70 using suitable supports and methods approved by the authority having jurisdiction. Provide independent support from building structure. Do not provide support from raceways, piping, ductwork, or other systems.
1. Installation Above Suspended Ceilings: Do not provide support from ceiling support system. Do not provide support from ceiling grid or allow conductors and cables to lay on ceiling tiles.
- G. Terminate cables using suitable fittings.
- H. Install conductors with a minimum of 12 inches (300 mm) of slack at each outlet.
- I. Make wiring connections using specified wiring connectors.
- J. Insulate splices and taps that are made with uninsulated connectors using methods suitable for the application, with insulation and mechanical strength at least equivalent to unspliced conductors.
- K. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 078400.
- L. Unless specifically indicated to be excluded, provide final connections to all equipment and devices, including those furnished by others, as required for a complete operating system.

END OF SECTION 260519

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SECTION 260526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUBMITTALS

- A. Product Data: Provide manufacturer's standard catalog pages and data sheets for grounding and bonding system components.

1.2 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.

PART 2 - PRODUCTS

2.1 GROUNDING AND BONDING REQUIREMENTS

- A. Existing Work: Where existing grounding and bonding system components are indicated to be reused, they may be reused only where they are free from corrosion, integrity and continuity are verified, and where acceptable to the authority having jurisdiction.
- B. Do not use products for applications other than as permitted by NFPA 70 and product listing.
- C. Unless specifically indicated to be excluded, provide all required components, conductors, connectors, conduit, boxes, fittings, supports, accessories, etc. as necessary for a complete grounding and bonding system.
- D. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
- E. Grounding System Resistance:
  - 1. Achieve specified grounding system resistance under normally dry conditions unless otherwise approved by Architect. Precipitation within the previous 48 hours does not constitute normally dry conditions.
  - 2. Grounding Electrode System: Not greater than 5 ohms to ground, when tested according to IEEE 81 using "fall-of-potential" method.
- F. Grounding Electrode System:
  - 1. Provide connection to required and supplemental grounding electrodes indicated to form grounding electrode system.
    - a. Provide continuous grounding electrode conductors without splice or joint.
    - b. Install grounding electrode conductors in raceway where exposed to physical damage. Bond grounding electrode conductor to metallic raceways at each end with bonding jumper.

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2. Metal Underground Water Pipe(s):
    - a. Provide connection to underground metal domestic and fire protection (where present) water service pipe(s) that are in direct contact with earth for at least 10 feet (3.0 m) at an accessible location not more than 5 feet (1.5 m) from the point of entrance to the building.
    - b. Provide bonding jumper(s) around insulating joints/pipes as required to make pipe electrically continuous.
    - c. Provide bonding jumper around water meter of sufficient length to permit removal of meter without disconnecting jumper.
  3. Metal In-Ground Support Structure:
    - a. Provide connection to metal in-ground support structure that is in direct contact with earth in accordance with NFPA 70.
  4. Ground Rod Electrode(s):
    - a. Provide three electrodes in an equilateral triangle configuration unless otherwise indicated or required.
    - b. Space electrodes not less than 10 feet (3.0 m) from each other and any other ground electrode.
  5. Provide additional ground electrode(s) as required to achieve specified grounding electrode system resistance.
  6. Ground Bar: Provide ground bar, separate from service equipment enclosure, for common connection point of grounding electrode system bonding jumpers as permitted in NFPA 70. Connect grounding electrode conductor provided for service-supplied system grounding to this ground bar.
    - a. Ground Bar Size: 1/4 by 2 by 12 inches (6 by 50 by 300 mm) unless otherwise indicated or required.
    - b. Where ground bar location is not indicated, locate in accessible location as near as possible to service disconnect enclosure.
    - c. Ground Bar Mounting Height: 18 inches (450 mm) above finished floor unless otherwise indicated.
  7. Ground Riser: Provide common grounding electrode conductor not less than 3/0 AWG for tap connections to multiple separately derived systems as permitted in NFPA 70.
- G. Service-Supplied System Grounding:
1. For each service disconnect, provide grounding electrode conductor to connect neutral (grounded) service conductor to grounding electrode system. Unless otherwise indicated, make connection at neutral (grounded) bus in service disconnect enclosure.
  2. For each service disconnect, provide main bonding jumper to connect neutral (grounded) bus to equipment ground bus where not factory-installed. Do not make any other connections between neutral (grounded) conductors and ground on load side of service disconnect.
- H. Bonding and Equipment Grounding:
1. Provide bonding for equipment grounding conductors, equipment ground busses, metallic equipment enclosures, metallic raceways and boxes, device grounding terminals, and other normally non-current-carrying conductive materials enclosing electrical conductors/equipment or likely to become energized as indicated and in accordance with NFPA 70.
  2. Provide insulated equipment grounding conductor in each feeder and branch circuit raceway. Do not use raceways as sole equipment grounding conductor.

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3. Where circuit conductor sizes are increased for voltage drop, increase size of equipment grounding conductor proportionally in accordance with NFPA 70.
4. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
5. Terminate branch circuit equipment grounding conductors on solidly bonded equipment ground bus only. Do not terminate on neutral (grounded) or isolated/insulated ground bus.
6. Provide bonding jumper across expansion or expansion/deflection fittings provided to accommodate conduit movement.
7. Provide bonding for interior metal piping systems in accordance with NFPA 70. This includes, but is not limited to:
  - a. Metal water piping where not already effectively bonded to metal underground water pipe used as grounding electrode.

I. Communications Systems Grounding and Bonding:

1. Provide intersystem bonding termination at service equipment or metering equipment enclosure and at disconnecting means for any additional buildings or structures in accordance with NFPA 70.
2. Provide bonding jumper in raceway from intersystem bonding termination to each communications room or backboard and provide ground bar for termination.
  - a. Bonding Jumper Size: 6 AWG, unless otherwise indicated or required.
  - b. Raceway Size: 3/4 inch (21 mm) trade size unless otherwise indicated or required.
  - c. Ground Bar Size: 1/4 by 2 by 12 inches (6 by 50 by 300 mm) unless otherwise indicated or required.

2.2 GROUNDING AND BONDING COMPONENTS

A. General Requirements:

1. Provide products listed, classified, and labeled as suitable for the purpose intended.
2. Provide products listed and labeled as complying with UL 467 where applicable.

B. Conductors for Grounding and Bonding, in Addition to Requirements of Section 260526:

1. Use insulated copper conductors unless otherwise indicated.
  - a. Exceptions:
    - 1) Use bare copper conductors where installed underground in direct contact with earth.
    - 2) Use bare copper conductors where directly encased in concrete (not in raceway).

C. Connectors for Grounding and Bonding:

1. Description: Connectors appropriate for the application and suitable for the conductors and items to be connected; listed and labeled as complying with UL 467.
2. Unless otherwise indicated, use exothermic welded connections for underground, concealed and other inaccessible connections.
3. Unless otherwise indicated, use mechanical connectors, compression connectors, or exothermic welded connections for accessible connections.



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D. Ground Bars:

1. Description: Copper rectangular ground bars with mounting brackets and insulators.
2. Size: As indicated.
3. Holes for Connections: As indicated or as required for connections to be made.

E. Ground Rod Electrodes:

1. Comply with NEMA GR 1.
2. Material: Copper-bonded (copper-clad) steel.
3. Size: 3/4 inch (19 mm) diameter by 10 feet (3.0 m) length, unless otherwise indicated.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Ground Rod Electrodes: Unless otherwise indicated, install ground rod electrodes vertically. Where encountered rock prohibits vertical installation, install at 45 degree angle or bury horizontally in trench at least 30 inches (750 mm) deep in accordance with NFPA 70 or provide ground plates.
  1. Outdoor Installations: Unless otherwise indicated, install with top of rod 6 inches (150 mm) below finished grade.
  2. Indoor Installations: Unless otherwise indicated, install with 4 inches (100 mm) of top of rod exposed.
- D. Make grounding and bonding connections using specified connectors.
  1. Remove nonconductive paint, enamel, or similar coating at threads, contact points, and contact surfaces.

END OF SECTION 260526

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SECTION 260529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUBMITTALS

- A. Product Data: Provide manufacturer's standard catalog pages and data sheets for channel/strut framing systems, nonpenetrating rooftop supports, and post-installed concrete/masonry anchors.

PART 2 - PRODUCTS

2.1 SUPPORT AND ATTACHMENT COMPONENTS

A. General Requirements:

1. Comply with the following. Where requirements differ, comply with most stringent.
  - a. NFPA 70.
  - b. Applicable building code.
  - c. Requirements of authorities having jurisdiction.
2. Provide required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for complete installation of electrical work.
3. Provide products listed, classified, and labeled as suitable for purpose intended, where applicable.
4. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for load to be supported with minimum safety factor of 1.5. Include consideration for vibration, equipment operation, and shock loads where applicable.
5. Do not use products for applications other than as permitted by NFPA 70 and product listing.
6. Do not use wire, chain, perforated pipe strap, or wood for permanent supports unless specifically indicated or permitted.
7. Steel Components: Use corrosion-resistant materials suitable for environment where installed.
  - a. Indoor Dry Locations: Use zinc-plated steel or approved equivalent unless otherwise indicated.
  - b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel, stainless steel, or approved equivalent unless otherwise indicated.
  - c. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
  - d. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.

B. Conduit and Cable Supports: Straps and clamps suitable for conduit or cable to be supported.

1. Conduit Straps: One-hole or two-hole type; steel or malleable iron.
2. Conduit Clamps: Bolted type unless otherwise indicated.

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- C. Outlet Box Supports: Hangers and brackets suitable for boxes to be supported.
- D. Metal Channel/Strut Framing Systems:
  - 1. Description: Factory-fabricated, continuous-slot, metal channel/strut and associated fittings, accessories, and hardware required for field assembly of supports.
  - 2. Comply with MFMA-4.
- E. Hanger Rods: Threaded, zinc-plated steel unless otherwise indicated.
- F. Anchors and Fasteners:
  - 1. Unless otherwise indicated and where not otherwise restricted, use anchor and fastener types indicated for specified applications.
  - 2. Post-Installed Concrete and Masonry Anchors: Evaluated and recognized by ICC Evaluation Service, LLC (ICC-ES) for compliance with applicable building code.

**PART 3 - EXECUTION**

**3.1 INSTALLATION**

- A. Install products in accordance with manufacturer's instructions.
- B. Install hangers and supports in accordance with NECA 1.
- C. Install anchors and fasteners in accordance with ICC Evaluation Services, LLC (ICC-ES) evaluation report conditions of use where applicable.
- D. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
- E. Unless specifically indicated or approved by Owner/Architect, do not provide support from suspended ceiling support system or ceiling grid.
- F. Unless specifically indicated or approved by Owner/Architect, do not provide support from roof deck.
- G. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.
- H. Equipment Support and Attachment:
  - 1. Use metal, fabricated supports or supports assembled from metal channel/strut to support equipment as required.
  - 2. Use metal channel/strut secured to studs to support equipment surface mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
  - 3. Use metal channel/strut to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
  - 4. Unless otherwise indicated, mount floor-mounted equipment on properly sized concrete pad 4 inches (100 mm) in height.

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5. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.

END OF SECTION 260529

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SECTION 260533.13 - CONDUIT FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUBMITTALS

- A. Product Data: Provide manufacturer's standard catalog pages and data sheets for conduits and fittings.

PART 2 - PRODUCTS

2.1 CONDUIT APPLICATIONS

- A. Do not use conduit and associated fittings for applications other than as permitted by NFPA 70, manufacturer's instructions, and product listing.
- B. Unless otherwise indicated and where not otherwise restricted, use conduit types indicated for specified applications. Where more than one listed application applies, comply with most restrictive requirements. Where conduit type for particular application is not specified, use galvanized steel rigid metal conduit.
- C. Underground:
  - 1. Under Slab on Grade: Use rigid PVC conduit.
  - 2. Exterior, Direct-Buried: Use rigid PVC conduit.
  - 3. Exterior, Embedded Within Concrete: Use rigid PVC conduit.
  - 4. Where rigid polyvinyl chloride (PVC) conduit is provided, transition to galvanized steel rigid metal conduit (RMC), galvanized steel intermediate metal conduit (IMC), or schedule 80 rigid PVC conduit where emerging from underground.
  - 5. Where rigid polyvinyl (PVC) conduit larger than 2-inch (53 mm) trade size is provided, use galvanized steel rigid metal conduit (RMC) elbows or PVC-coated galvanized steel rigid metal conduit (RMC) elbows for bends.
  - 6. Where galvanized steel rigid metal conduit (RMC) or galvanized steel intermediate metal conduit (IMC) is installed in direct contact with earth where soil has resistivity of less than 2000 ohm-centimeters or is characterized as severely corrosive based on soils report or local experience, use corrosion protection tape, factory-applied corrosion protection coating, or field-applied corrosion protection compound acceptable to authorities having jurisdiction to provide supplementary corrosion protection.
  - 7. Where galvanized steel electrical metallic tubing (EMT) is installed in direct contact with earth, use corrosion protection tape, factory-applied corrosion protection coating, or field-applied corrosion protection compound acceptable to authorities having jurisdiction to provide supplementary corrosion protection.
  - 8. Where aluminum rigid metal conduit (RMC) or aluminum electrical metallic tubing (EMT) is installed in direct contact with earth, use corrosion protection tape, factory-applied corrosion protection coating, or field-applied corrosion protection compound

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acceptable to authorities having jurisdiction to provide supplementary corrosion protection.

9. Where galvanized rigid metal conduit (RMC), galvanized steel intermediate metal conduit (IMC), or galvanized steel electrical metallic tubing (EMT) emerges from concrete into soil, use corrosion protection tape, factory-applied corrosion protection coating, or field-applied corrosion protection compound acceptable to authorities having jurisdiction to provide supplementary corrosion protection for minimum of 4 inches (100 mm) on either side of where conduit emerges.
- D. Embedded Within Concrete:
1. Within Slab on Grade: Use PVC-coated galvanized steel rigid metal conduit (RMC) or rigid PVC conduit. Embed within structural slabs only where approved by Structural Engineer.
  2. Within Slab Above Ground: Use PVC-coated galvanized steel rigid metal conduit (RMC) or rigid PVC conduit. Embed within structural slabs only where approved by Structural Engineer.
  3. Where rigid polyvinyl (PVC) conduit is provided, transition to galvanized steel rigid metal conduit (RMC), galvanized steel intermediate metal conduit (IMC), or galvanized steel electrical metallic tubing (EMT) where emerging from concrete.
  4. Where galvanized steel electrical metallic tubing (EMT) emerges from concrete into salt air, use corrosion protection tape, factory-applied corrosion protection coating, or field-applied corrosion protection compound acceptable to authorities having jurisdiction to provide supplementary corrosion protection for minimum of 4 inches (100 mm) on either side of where conduit emerges.
- E. Concealed Within Masonry Walls: Use galvanized steel rigid metal conduit (RMC), galvanized steel intermediate metal conduit (IMC), or galvanized steel electrical metallic tubing (EMT).
- F. Concealed Within Hollow Stud Walls: Use galvanized steel rigid metal conduit (RMC), galvanized steel intermediate metal conduit (IMC), galvanized steel electrical metallic tubing (EMT), or aluminum electrical metallic tubing (EMT).
- G. Concealed Above Accessible Ceilings: Use galvanized steel rigid metal conduit (RMC), galvanized steel intermediate metal conduit (IMC), galvanized steel electrical metallic tubing (EMT), or aluminum electrical metallic tubing (EMT).
- H. Interior, Damp or Wet Locations: Use galvanized steel rigid metal conduit (RMC), galvanized steel intermediate metal conduit (IMC), or galvanized steel electrical metallic tubing (EMT).
- I. Exposed, Interior, Not Subject to Physical Damage: Use aluminum rigid metal conduit (RMC), galvanized steel intermediate metal conduit (IMC), galvanized steel electrical metallic tubing (EMT), or aluminum electrical metallic tubing (EMT).
- J. Exposed, Interior, Subject to Physical Damage: Use galvanized steel rigid metal conduit (RMC), galvanized steel intermediate metal conduit (IMC), or galvanized steel electrical metallic tubing (EMT).
- K. Exposed, Exterior, Not Subject to Severe Physical Damage: Use galvanized steel rigid metal conduit (RMC), galvanized steel intermediate metal conduit (IMC), or galvanized steel electrical metallic tubing (EMT).

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- L. Exposed, Exterior, Subject to Severe Physical Damage: Use galvanized steel rigid metal conduit (RMC) or galvanized steel intermediate metal conduit (IMC).
- M. Flexible Connections to Luminaires Above Accessible Ceilings: Use flexible metal conduit (FMC).
- N. Flexible Connections to Vibrating Equipment:
  - 1. Dry Locations: Use flexible metal conduit (FMC).
  - 2. Damp, Wet, or Corrosive Locations: Use liquidtight flexible metal conduit (LFMC).
  - 3. Maximum Length: 6 feet (1.8 m) unless otherwise indicated.
- O. Fished in Existing Walls, Where Necessary: Use flexible metal conduit (FMC), galvanized steel electrical metallic tubing (EMT), or aluminum electrical metallic tubing (EMT).

2.2 CONDUIT - GENERAL REQUIREMENTS

- A. Comply with NFPA 70.
- B. Fittings for Grounding and Bonding: See Section 260526 for additional requirements.
- C. Provide conduit, fittings, supports, and accessories required for complete raceway system.
- D. Provide products listed, classified, and labeled as suitable for purpose intended.
- E. Minimum Conduit Size, Unless Otherwise Indicated:
  - 1. Branch Circuits: 3/4-inch (21 mm) trade size.
  - 2. Underground, Interior: 1-inch (27 mm) trade size.
  - 3. Underground, Exterior: 1-inch (27 mm) trade size.
- F. Where conduit size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

2.3 GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

- A. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6.
- B. Fittings:
  - 1. Nonhazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B or UL 6.
  - 2. Material: Use steel or malleable iron.
  - 3. Connectors and Couplings: Use threaded type fittings only. Threadless fittings, including set screw and compression/gland types, are not permitted.

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2.4 ALUMINUM RIGID METAL CONDUIT (RMC)

- A. Description: NFPA 70, Type RMC aluminum rigid metal conduit complying with ANSI C80.5 and listed and labeled as complying with UL 6A.
- B. Fittings:
  - 1. Nonhazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B or UL 6A.
  - 2. Material: Use aluminum.
  - 3. Connectors and Couplings: Use threaded type fittings only. Threadless fittings, including set screw and compression/gland types, are not permitted.

2.5 GALVANIZED STEEL INTERMEDIATE METAL CONDUIT (IMC)

- A. Description: NFPA 70, Type IMC galvanized steel intermediate metal conduit complying with ANSI C80.6 and listed and labeled as complying with UL 1242.
- B. Fittings:
  - 1. Nonhazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B or UL 1242.
  - 2. Material: Use steel or malleable iron.
  - 3. Connectors and Couplings: Use threaded type fittings only. Threadless fittings, including set screw and compression/gland types, are not permitted.

2.6 PVC-COATED GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

- A. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit with external polyvinyl chloride (PVC) coating complying with NEMA RN 1 and listed and labeled as complying with UL 6.
- B. Exterior Coating: Polyvinyl chloride (PVC), nominal thickness of 40 mil, 0.040 inch (1.02 mm).
- C. PVC-Coated Boxes and Fittings:
  - 1. Manufacturer: Same as manufacturer of PVC-coated conduit to be installed.
  - 2. Nonhazardous Locations: Use boxes and fittings listed and labeled as complying with UL 514A, UL 514B, or UL 6.
  - 3. Material: Use steel or malleable iron.
  - 4. Exterior Coating: Polyvinyl chloride (PVC), minimum thickness of 40 mil, 0.040 inch (1.02 mm).
- D. PVC-Coated Supports: Furnish with exterior coating of polyvinyl chloride (PVC), minimum thickness of 15 mil, 0.015 inch (0.38 mm).



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2.7 FLEXIBLE METAL CONDUIT (FMC)

- A. Description: NFPA 70, Type FMC standard-wall steel flexible metal conduit listed and labeled as complying with UL 1, and listed for use in classified firestop systems.
- B. Fittings:
  - 1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
  - 2. Material: Use steel or malleable iron.

2.8 LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC)

- A. Description: NFPA 70, Type LFMC polyvinyl chloride (PVC) jacketed steel flexible metal conduit listed and labeled as complying with UL 360.
- B. Fittings:
  - 1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
  - 2. Material: Use steel or malleable iron.

2.9 GALVANIZED STEEL ELECTRICAL METALLIC TUBING (EMT)

- A. Description: NFPA 70, Type EMT galvanized steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797.
- B. Fittings:
  - 1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
  - 2. Material: Use steel or malleable iron.
  - 3. Connectors and Couplings: Use compression/gland or set-screw type.
    - a. Do not use indenter type connectors and couplings.

2.10 ALUMINUM ELECTRICAL METALLIC TUBING (EMT)

- A. Description: NFPA 70, Type EMT aluminum electrical metallic tubing listed and labeled as complying with UL 797A.
- B. Fittings:
  - 1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B; listed for use with aluminum EMT.
  - 2. Material: Use aluminum.
  - 3. Connectors and Couplings: Use compression/gland or set-screw type.
    - a. Do not use indenter type connectors and couplings.

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2.11 RIGID POLYVINYL CHLORIDE (PVC) CONDUIT

- A. Description: NFPA 70, Type PVC rigid polyvinyl chloride conduit complying with NEMA TC 2 and listed and labeled as complying with UL 651; Schedule 40 unless otherwise indicated, Schedule 80 where subject to physical damage; rated for use with conductors rated 90 degrees C.
- B. Fittings:
  - 1. Manufacturer: Same as manufacturer of conduit to be connected.
  - 2. Description: Fittings complying with NEMA TC 3 and listed and labeled as complying with UL 651; material to match conduit.

2.12 ACCESSORIES

- A. Corrosion Protection Tape: PVC-based, minimum thickness of 20 mil, 0.020 inch (0.51 mm).
- B. Conduit Joint Compound: Corrosion-resistant, electrically conductive compound listed as complying with UL 2419; suitable for use with conduit to be installed.
- C. Pull Strings: Use nylon or polyester tape with average breaking strength of not less than 1,250 lbf (5.6 kN).
- D. Sealing Systems for Concrete Penetrations:
  - 1. Sleeves: Provide water stop ring or cement coating that bonds to concrete to prevent water infiltration.
  - 2. Rate for minimum of 40 psig; suitable for sealing around conduits to be installed.
- E. Sealing Systems for Roof Penetrations: Premanufactured components and accessories as required to preserve integrity of roofing system and maintain roof warranty; suitable for conduits and roofing system to be installed; designed to accommodate existing penetrations where applicable.
- F. Flashing Panels for Exterior Wall Penetrations: Premanufactured components and accessories as required to preserve integrity of building envelope; suitable for conduits and facade materials to be installed.
- G. Firestop Sleeves: Listed; provide as required to preserve fire resistance rating of building elements.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install conduit in accordance with NECA 1.

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- C. Install galvanized steel rigid metal conduit (RMC) in accordance with NECA 101.
- D. Install aluminum rigid metal conduit (RMC) in accordance with NECA 102.
- E. Install intermediate metal conduit (IMC) in accordance with NECA 101.
- F. Install PVC-coated galvanized steel rigid metal conduit (RMC) using only tools approved by manufacturer.
- G. Install rigid polyvinyl chloride (PVC) conduit in accordance with NECA 111.
- H. Conduit Routing:
  - 1. Conceal conduits unless specifically indicated to be exposed.
  - 2. Conduits in the following areas may be exposed, unless otherwise indicated:
    - a. Electrical rooms.
    - b. Mechanical equipment rooms.
    - c. Within joists in areas with no ceiling.
  - 3. Unless otherwise approved, do not route exposed conduits:
    - a. Across floors.
    - b. Across roofs.
    - c. Across top of parapet walls.
    - d. Across building exterior surfaces.
  - 4. Arrange conduit to provide no more than equivalent of four 90-degree bends between pull points.
  - 5. Arrange conduit to provide no more than 150 feet (46 m) between pull points.
  - 6. Arrange conduit to prevent moisture traps. Provide drain fittings at low points and at sealing fittings where moisture may collect.
  - 7. Maintain minimum clearance of 6 inches (150 mm) between conduits and piping for other systems.
- I. Conduit Support:
  - 1. Secure and support conduits in accordance with NFPA 70 using suitable supports and methods approved by authorities having jurisdiction; see Section 260529.
  - 2. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
  - 3. Installation Above Suspended Ceilings: Do not provide support from ceiling support system. Do not provide support from ceiling grid or allow conduits to lay on ceiling tiles.
- J. Connections and Terminations:
  - 1. Use approved zinc-rich paint or conduit joint compound on field-cut threads of galvanized steel conduits prior to making connections.
  - 2. Where two threaded conduits must be joined and neither can be rotated, use three-piece couplings or split couplings. Do not use running threads.
  - 3. Provide drip loops for liquidtight flexible conduit connections to prevent drainage of liquid into connectors.
  - 4. Terminate threaded conduits in boxes and enclosures using threaded hubs or double lock nuts for dry locations and raintight hubs for wet locations.

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5. Provide insulating bushings, insulated throats, or listed metal fittings with smooth, rounded edges at conduit terminations to protect conductors.

**K. Penetrations:**

1. Do not penetrate or otherwise notch or cut structural members, including footings and grade beams, without approval of Structural Engineer.
2. Provide sleeves for penetrations as indicated or as required to facilitate installation. Set sleeves flush with exposed surfaces unless otherwise indicated or required.
3. Where conduits penetrate waterproof membrane, seal as required to maintain integrity of membrane.
4. Make penetrations for roof-mounted equipment within associated equipment openings and curbs where possible to minimize roofing system penetrations. Where penetrations are necessary, seal as indicated or as required to preserve integrity of roofing system and maintain roof warranty.
5. Install firestopping to preserve fire resistance rating of partitions and other elements.

**L. Underground Installation:**

1. Provide trenching and backfilling.
2. Minimum Cover, Unless Otherwise Indicated or Required:
  - a. Underground, Exterior: 18 inches (460 mm).
  - b. Under Slab on Grade: 12 inches (300 mm) to bottom of slab.

**M. Conduit Movement Provisions:** Where conduits are subject to movement, provide expansion and expansion/deflection fittings to prevent damage to enclosed conductors or connected equipment. This includes, but is not limited to:

1. Where conduits cross structural joints intended for expansion, contraction, or deflection.
2. Where calculated in accordance with NFPA 70 for rigid polyvinyl chloride (PVC) conduit installed above ground to compensate for thermal expansion and contraction.
3. Where conduits are subject to earth movement by settlement or frost.

**N. Conduit Sealing:**

1. Use foam conduit sealant to prevent entry of moisture and gases. This includes, but is not limited to:
  - a. Where conduits enter building from outside.
  - b. Where service conduits enter building from underground distribution system.
  - c. Where conduits enter building from underground.
  - d. Where conduits may transport moisture to contact live parts.
2. Where conduits cross barriers between areas of potential substantial temperature differential, use foam conduit sealant at accessible point near penetration to prevent condensation. This includes, but is not limited to:
  - a. Where conduits pass from outdoors into conditioned interior spaces.
  - b. Where conduits pass from unconditioned interior spaces into conditioned interior spaces.
  - c. Where conduits penetrate coolers or freezers.
3. Where conduits cross boundaries of hazardous/classified locations, provide identified/listed sealing fittings or conduit mechanical seals as approved by authorities having jurisdiction; locate as indicated or in accordance with NFPA 70.

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- O. Provide pull string in each empty conduit and in conduits where conductors and cables are to be installed by others. Leave minimum slack of 12 inches (300 mm) at each end.

END OF SECTION 260533.13

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SECTION 260533.16 - BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUBMITTALS

- A. Product Data: Provide manufacturer's standard catalog pages and data sheets for cabinets and enclosures, boxes for hazardous (classified) locations, floor boxes, and underground boxes/enclosures.

1.2 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.

PART 2 - PRODUCTS

2.1 BOXES

- A. General Requirements:

1. Do not use boxes and associated accessories for applications other than as permitted by NFPA 70 and product listing.
2. Provide all boxes, fittings, supports, and accessories required for a complete raceway system and to accommodate devices and equipment to be installed.
3. Provide products listed, classified, and labeled as suitable for the purpose intended.
4. Where box size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
5. Provide grounding terminals within boxes where equipment grounding conductors terminate.

- B. Outlet and Device Boxes Up to 100 cubic inches (1,650 cu cm), Including Those Used as Junction and Pull Boxes:

1. Use sheet-steel boxes for dry locations unless otherwise indicated or required.
2. Use cast iron boxes or cast aluminum boxes for damp or wet locations unless otherwise indicated or required; furnish with compatible weatherproof gasketed covers.
3. Use cast iron boxes or cast aluminum boxes where exposed galvanized steel rigid metal conduit or exposed intermediate metal conduit (IMC) is used.
4. Use cast aluminum boxes where aluminum rigid metal conduit is used.
5. Use nonmetallic boxes where exposed rigid PVC conduit is used.
6. Use suitable concrete type boxes where flush-mounted in concrete.
7. Use suitable masonry type boxes where flush-mounted in masonry walls.
8. Use raised covers suitable for the type of wall construction and device configuration where required.
9. Use shallow boxes where required by the type of wall construction.
10. Do not use "through-wall" boxes designed for access from both sides of wall.

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11. Sheet-Steel Boxes: Comply with NEMA OS 1, and list and label as complying with UL 514A.
  12. Cast Metal Boxes: Comply with NEMA FB 1, and list and label as complying with UL 514A; furnish with threaded hubs.
  13. Nonmetallic Boxes: Comply with NEMA OS 2, and list and label as complying with UL 514C.
  14. Boxes for Supporting Luminaires and Ceiling Fans: Listed as suitable for the type and weight of load to be supported; furnished with fixture stud to accommodate mounting of luminaire where required.
  15. Boxes for Ganged Devices: Use multigang boxes of single-piece construction. Do not use field-connected gangable boxes unless specifically indicated or permitted.
- C. Cabinets and Enclosures, Including Junction and Pull Boxes Larger Than 100 cubic inches (1,650 cu cm):
1. Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E, or UL 508A.
  2. Junction and Pull Boxes Larger Than 100 cubic inches (1,650 cu cm):
    - a. Provide screw-cover or hinged-cover enclosures unless otherwise indicated.
  3. Cabinets and Hinged-Cover Enclosures, Other Than Junction and Pull Boxes:

**PART 3 - EXECUTION**

**3.1 INSTALLATION**

- A. Install products in accordance with manufacturer's instructions.
- B. Install boxes in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards where mounting heights are not indicated.
- C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- D. Provide separate boxes for emergency power and normal power systems.
- E. Unless otherwise indicated, provide separate boxes for line voltage and low voltage systems.
- F. Flush-mount boxes in finished areas unless specifically indicated to be surface-mounted.
- G. Unless otherwise indicated, boxes may be surface-mounted where exposed conduits are indicated or permitted.
- H. Box Locations:
  1. Locate boxes to be accessible.
  2. Locate boxes so that wall plates do not span different building finishes.
  3. Locate boxes so that wall plates do not cross masonry joints.

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4. Unless otherwise indicated, where multiple outlet boxes are installed at the same location at different mounting heights, install along a common vertical center line.
  5. Do not install flush-mounted boxes on opposite sides of walls back-to-back. Provide minimum 6 inches (150 mm) horizontal separation unless otherwise indicated.
  6. Fire Resistance Rated Walls: Install flush-mounted boxes such that the required fire resistance will not be reduced.
- I. Box Supports:
1. Secure and support boxes in accordance with NFPA 70 and Section 260529 using suitable supports and methods approved by the authority having jurisdiction.
  2. Provide required seismic controls in accordance with Section 260548.
  3. Provide independent support from building structure except for cast metal boxes (other than boxes used for fixture support) supported by threaded conduit connections in accordance with NFPA 70. Do not provide support from piping, ductwork, or other systems.
  4. Installation Above Suspended Ceilings: Do not provide support from ceiling grid or ceiling support system.
- J. Floor-Mounted Cabinets: Mount on properly sized 4 inch (100 mm) high concrete pad.
- K. Install boxes as required to preserve insulation integrity.
- L. Install firestopping to preserve fire resistance rating of partitions and other elements.

END OF SECTION 260533.16



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SECTION 260533.23 - SURFACE RACEWAYS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUBMITTALS

- A. Product Data: Provide manufacturer's standard catalog pages and data sheets including dimensions, knockout sizes and locations, materials, fabrication details, finishes, service condition requirements, and accessories.
  - 1. Surface Raceway Systems: Include information on fill capacities for conductors and cables.

PART 2 - PRODUCTS

2.1 RACEWAY REQUIREMENTS

- A. Provide all components, fittings, supports, and accessories required for a complete raceway system.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Do not use raceways for applications other than as permitted by NFPA 70 and product listing.

2.2 SURFACE RACEWAY SYSTEMS

- A. Surface Metal Raceways: Listed and labeled as complying with UL 5.

2.3 WIREWAYS

- A. Description: Lay-in wireways and wiring troughs with removable covers; listed and labeled as complying with UL 870.
- B. Wireway Type, Unless Otherwise Indicated:
  - 1. Indoor Clean, Dry Locations: NEMA 250, Type 1, painted steel with screw-cover.
  - 2. Outdoor Locations: NEMA 250, Type 3R, painted steel with screw-cover; include provision for padlocking.
- C. Finish for Painted Steel Wireways: Manufacturer's standard grey unless otherwise indicated.
- D. Minimum Wireway Size: 4 by 4 inches (100 by 100 mm) unless otherwise indicated.
- E. Where wireway size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

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**PART 3 - EXECUTION**

**3.1 INSTALLATION**

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Install raceways plumb and level.
- D. Arrange wireways and associated raceway connections to comply with NFPA 70, including but not limited to requirements for deflected conductors and wireways used as pullboxes. Increase size of wireway where necessary.
- E. Secure and support raceways in accordance with Section 260529 at intervals complying with NFPA 70 and manufacturer's requirements.
- F. Close unused raceway openings.

END OF SECTION 260533.23

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SECTION 260553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUBMITTALS

- A. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product.

1.2 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.

PART 2 - PRODUCTS

2.1 IDENTIFICATION REQUIREMENTS

- A. Identification for Equipment:
1. Use identification nameplate to identify each piece of electrical distribution and control equipment and associated sections, compartments, and components.
    - a. Panelboards:
      - 1) Identify ampere rating.
      - 2) Identify voltage and phase.
      - 3) Identify power source and circuit number. Include location when not within sight of equipment.
      - 4) Use typewritten circuit directory to identify load(s) served for panelboards with a door. Identify spares and spaces using pencil.
      - 5) For power panelboards without a door, use identification nameplate to identify load(s) served for each branch device. Do not identify spares and spaces.
    2. Service Equipment:
      - a. Use identification nameplate to identify each service disconnecting means.
      - b. For buildings or structures supplied by more than one service, or any combination of branch circuits, feeders, and services, use identification nameplate or means of identification acceptable to authority having jurisdiction at each service disconnecting means to identify all other services, feeders, and branch circuits supplying that building or structure. Verify format and descriptions with authority having jurisdiction.
    3. Available Fault Current Documentation: Use identification label to identify the available fault current and date calculations were performed at locations requiring documentation by NFPA 70 including but not limited to the following.
      - a. Service equipment.
      - b. Panelboards.
    4. Arc Flash Hazard Warning Labels: Use warning labels to identify arc flash hazards for electrical equipment, such as switchboards, panelboards, industrial control panels, meter

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socket enclosures, and motor control centers that are likely to require examination, adjustment, servicing, or maintenance while energized.

- a. Minimum Size: 3.5 by 5 inches (89 mm by 127 mm).
  - b. Legend: Include orange header that reads "WARNING", followed by the word message "Arc Flash and Shock Hazard; Appropriate PPE Required; Do not operate controls or open covers without appropriate personal protection equipment; Failure to comply may result in injury or death; Refer to NFPA 70E for minimum PPE requirements" or approved equivalent.
  - c. Service Equipment: Include the following information in accordance with NFPA 70.
    - 1) Nominal system voltage.
    - 2) Available fault current.
    - 3) Date label applied.
5. Use warning signs to identify electrical hazards for entrances to all rooms and other guarded locations that contain exposed live parts operating at 600 V nominal or less with the word message "DANGER; Electrical hazard; Authorized personnel only" or approved equivalent.
  6. Use warning signs to identify electrical hazards for entrances to all buildings, vaults, rooms, or enclosures containing exposed live parts or exposed conductors operating at over 600 V nominal with the word message "DANGER; HIGH VOLTAGE; KEEP OUT".
  7. Use warning labels to identify electrical hazards for equipment, compartments, and enclosures containing exposed live parts or exposed conductors operating at over 600 V nominal with the word message "DANGER; HIGH VOLTAGE; KEEP OUT".
  8. Use warning labels, identification nameplates, or identification labels to identify electrical hazards for equipment where multiple power sources are present with the word message "DANGER; Hazardous voltage; Multiple power sources may be present; Disconnect all electric power including remote disconnects before servicing" or approved equivalent.
- B. Identification for Conductors and Cables:
1. Color Coding for Power Conductors 600 V and Less: Comply with Section 260519.
  2. Use identification nameplate or identification label to identify color code for ungrounded and grounded power conductors inside door or enclosure at each piece of feeder or branch-circuit distribution equipment when premises has feeders or branch circuits served by more than one nominal voltage system.
- C. Identification for Devices:
1. Wiring Device and Wallplate Finishes: Comply with Section 262726.
  2. Use identification label or engraved wallplate to identify serving branch circuit for all receptacles.
    - a. For receptacles in public areas or in areas as directed by Architect, provide identification on inside surface of wallplate.
  3. Use identification label to identify receptacles protected by upstream GFI protection, where permitted.
- D. Identification for Luminaires:

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1. Use permanent red dot on luminaire frame to identify luminaires connected to emergency power system.

2.2 IDENTIFICATION NAMEPLATES AND LABELS

A. Identification Nameplates:

1. Materials:
  - a. Indoor Clean, Dry Locations: Use plastic nameplates.
  - b. Outdoor Locations: Use plastic, stainless steel, or aluminum nameplates suitable for exterior use.
2. Plastic Nameplates: Two-layer or three-layer laminated acrylic or electrically non-conductive phenolic with beveled edges; minimum thickness of 1/16 inch (1.6 mm); engraved text.
3. Stainless Steel Nameplates: Minimum thickness of 1/32 inch (0.8 mm); engraved or laser-etched text.
4. Aluminum Nameplates: Anodized; minimum thickness of 1/32 inch (0.8 mm); engraved or laser-etched text.

B. Identification Labels:

1. Materials: Use self-adhesive laminated plastic labels; UV, chemical, water, heat, and abrasion resistant.
2. Text: Use factory pre-printed or machine-printed text. Do not use handwritten text unless otherwise indicated.

C. Format for Equipment Identification:

1. Minimum Size: 1 inch (25 mm) by 2.5 inches (64 mm).
2. Legend:
  - a. Equipment designation or other approved description.
3. Text: All capitalized unless otherwise indicated.
4. Minimum Text Height:
  - a. Equipment Designation: 1/2 inch (13 mm).
5. Color:
  - a. Normal Power System: White text on black background.

D. Format for General Information and Operating Instructions:

1. Minimum Size: 1 inch (25 mm) by 2.5 inches (64 mm).
2. Legend: Include information or instructions indicated or as required for proper and safe operation and maintenance.
3. Text: All capitalized unless otherwise indicated.
4. Minimum Text Height: 1/4 inch (6 mm).
5. Color: Black text on white background unless otherwise indicated.

E. Format for Caution and Warning Messages:

1. Minimum Size: 2 inches (51 mm) by 4 inches (100 mm).

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2. Legend: Include information or instructions indicated or as required for proper and safe operation and maintenance.
3. Text: All capitalized unless otherwise indicated.
4. Minimum Text Height: 1/2 inch (13 mm).
5. Color: Black text on yellow background unless otherwise indicated.

F. Format for Receptacle Identification:

1. Minimum Size: 3/8 inch (10 mm) by 1.5 inches (38 mm).
2. Legend: Power source and circuit number or other designation indicated.
3. Text: All capitalized unless otherwise indicated.
4. Minimum Text Height: 3/16 inch (5 mm).
5. Color: Black text on clear background.

2.3 UNDERGROUND WARNING TAPE

- A. Materials: Use foil-backed detectable type polyethylene tape suitable for direct burial, unless otherwise indicated.
- B. Foil-backed Detectable Type Tape: 3 inches (76 mm) wide, with minimum thickness of 5 mil (0.1 mm), unless otherwise required for proper detection.
- C. Legend: Type of service, continuously repeated over full length of tape.
- D. Color:
  1. Tape for Buried Power Lines: Black text on red background.

2.4 WARNING SIGNS AND LABELS

- A. Comply with ANSI Z535.2 or ANSI Z535.4 as applicable.
- B. Warning Signs:
  1. Materials:
    - a. Indoor Dry, Clean Locations: Use factory pre-printed rigid plastic or self-adhesive vinyl signs.
    - b. Outdoor Locations: Use factory pre-printed rigid aluminum signs.
  2. Minimum Size: 7 by 10 inches (178 by 254 mm) unless otherwise indicated.
- C. Warning Labels:
  1. Materials: Use factory pre-printed or machine-printed self-adhesive polyester or self-adhesive vinyl labels; UV, chemical, water, heat, and abrasion resistant; produced using materials recognized to UL 969.
  2. Machine-Printed Labels: Use thermal transfer process printing machines and accessories recommended by label manufacturer.
  3. Minimum Size: 2 by 4 inches (51 mm by 102 mm) unless otherwise indicated.

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PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Secure nameplates to exterior surfaces of enclosures using stainless steel screws and to interior surfaces using self-adhesive backing or epoxy cement.
- C. Install underground warning tape above buried lines with one tape per trench at 3 inches (75 mm) below finished grade.
- D. Secure rigid signs using stainless steel screws.

END OF SECTION 260553

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SECTION 260923 - LIGHTING CONTROL DEVICES

PART 1 - GENERAL

1.1 SUBMITTALS

- A. Product Data: Include ratings, configurations, standard wiring diagrams, dimensions, colors, service condition requirements, and installed features.

1.2 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.

PART 2 - PRODUCTS

2.1 LIGHTING CONTROL DEVICES - GENERAL REQUIREMENTS

- A. Provide products listed, classified, and labeled as suitable for the purpose intended.
- B. Unless specifically indicated to be excluded, provide all required conduit, wiring, connectors, hardware, components, accessories, etc. as required for a complete operating system.

2.2 OCCUPANCY SENSORS

- A. All Occupancy Sensors:
  - 1. Description: Factory-assembled commercial specification grade devices for indoor use capable of sensing both major motion, such as walking, and minor motion, such as small desktop level movements, according to published coverage areas, for automatic control of load indicated.
  - 2. Turn-Off Delay: Field adjustable, with time delay settings up to 30 minutes.
  - 3. Compatibility (Non-Dimming Sensors): Suitable for controlling incandescent lighting, low-voltage lighting with electronic and magnetic transformers, fluorescent lighting with electronic and magnetic ballasts, LED lighting, and fractional motor loads, with no minimum load requirements.
  - 4. Load Rating for Line Voltage Occupancy Sensors: As required to control the load indicated on drawings.
- B. Wall Switch Occupancy Sensors:
  - 1. All Wall Switch Occupancy Sensors:
    - a. Description: Occupancy sensors designed for installation in standard wall box at standard wall switch mounting height with a field of view of 180 degrees, integrated manual control capability, and no leakage current to load in off mode.



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- b. Finish: Match finishes specified for wiring devices in Section 262726, unless otherwise indicated.
  - 2. Passive Infrared (PIR) Wall Switch Occupancy Sensors: Capable of detecting motion within an area of 900 square feet (83.6 sq m).
  - 3. Ultrasonic Wall Switch Occupancy Sensors: Capable of detecting motion within an area of 400 square feet (37.2 sq m).
  - 4. Passive Infrared/Ultrasonic Dual Technology Wall Switch Occupancy Sensors: Capable of detecting motion within an area of 900 square feet (83.6 sq m).
- C. Power Packs for Low Voltage Occupancy Sensors:
- 1. Description: Plenum rated, self-contained low voltage class 2 transformer and relay compatible with specified low voltage occupancy sensors for switching of line voltage loads.
  - 2. Provide quantity and configuration of power and slave packs with all associated wiring and accessories as required to control the load indicated on drawings.
  - 3. Input Supply Voltage: Dual rated for 120/277 V ac.
  - 4. Load Rating: As required to control the load indicated on drawings.

**PART 3 - EXECUTION**

**3.1 INSTALLATION**

- A. Install lighting control devices in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.
- B. Coordinate locations of outlet boxes provided under Section 260533.16 as required for installation of lighting control devices provided under this section.
  - 1. Mounting Heights: Unless otherwise indicated, as follows:
    - a. Wall Switch Occupancy Sensors: 48 inches (1.2 m) above finished floor.
- C. Install lighting control devices in accordance with manufacturer's instructions.
- D. Unless otherwise indicated, connect lighting control device grounding terminal or conductor to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
- E. Where required and not furnished with lighting control device, provide wall plate in accordance with Section 262726.
- F. Provide required supports in accordance with Section 260529.
- G. Occupancy Sensor Locations:
  - 1. Location Adjustments: Locations indicated are diagrammatic and only intended to indicate which rooms or areas require devices. Provide quantity and locations as required for complete coverage of respective room or area based on manufacturer's recommendations for installed devices.

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2. Locate ultrasonic and dual technology passive infrared/ultrasonic occupancy sensors a minimum of 4 feet (1.2 m) from air supply ducts or other sources of heavy air flow and as per manufacturer's recommendations, in order to minimize false triggers.
  
- H. Lamp Burn-In: Operate lamps at full output for minimum of 100 hours or prescribed period per manufacturer's recommendations prior to use with any dimming controls. Replace lamps that fail prematurely due to improper lamp burn-in.
  
- I. Where indicated or required, provide cabinet or enclosure in accordance with Section 260533.16 for mounting of lighting control device system components.

END OF SECTION 260923

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SECTION 262416 - PANELBOARDS

PART 1 - GENERAL

1.1 SUBMITTALS

- A. Product Data: Provide manufacturer's standard catalog pages and data sheets for panelboards, enclosures, overcurrent protective devices, and other installed components and accessories.

1.2 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.

PART 2 - PRODUCTS

2.1 PANELBOARDS - GENERAL REQUIREMENTS

- A. Provide products listed, classified, and labeled as suitable for the purpose intended.
- B. Short Circuit Current Rating:
  - 1. Provide panelboards with listed short circuit current rating not less than the available fault current at the installed location as indicated on the drawings.
- C. Mains: Configure for top or bottom incoming feed as indicated or as required for the installation.
- D. Bussing: Sized in accordance with UL 67 temperature rise requirements.
  - 1. Provide solidly bonded equipment ground bus in each panelboard, with a suitable lug for each feeder and branch circuit equipment grounding conductor.
- E. Conductor Terminations: Suitable for use with the conductors to be installed.
- F. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.
  - 1. Boxes: Galvanized steel unless otherwise indicated.
    - a. Provide wiring gutters sized to accommodate the conductors to be installed.
  - 2. Lockable Doors: All locks keyed alike unless otherwise indicated.
- G. Future Provisions: Prepare all unused spaces for future installation of devices including bussing, connectors, mounting hardware and all other required provisions.

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2.2 LIGHTING AND APPLIANCE PANELBOARDS

- A. Description: Panelboards complying with NEMA PB 1, lighting and appliance branch circuit type, circuit breaker type, and listed and labeled as complying with UL 67; ratings, configurations and features as indicated on the drawings.
- B. Conductor Terminations:
  - 1. Main and Neutral Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
  - 2. Main and Neutral Lug Type: Mechanical.
- C. Bussing:
  - 1. Phase and Neutral Bus Material: Aluminum.
  - 2. Ground Bus Material: Aluminum.
- D. Circuit Breakers: Thermal magnetic bolt-on type unless otherwise indicated.
- E. Enclosures:
  - 1. Provide surface-mounted or flush-mounted enclosures as indicated.
  - 2. Fronts: Provide lockable hinged door with concealed hinges for access to overcurrent protective device handles without exposing live parts.
  - 3. Provide clear plastic circuit directory holder mounted on inside of door.

2.3 OVERCURRENT PROTECTIVE DEVICES

- A. Molded Case Circuit Breakers:
  - 1. Description: Quick-make, quick-break, over center toggle, trip-free, trip-indicating circuit breakers listed and labeled as complying with UL 489, and complying with FS W-C-375 where applicable; ratings, configurations, and features as indicated on the drawings.
  - 2. Interrupting Capacity:
    - a. Provide circuit breakers with interrupting capacity as required to provide the short circuit current rating indicated, but not less than:
      - 1) 10,000 rms symmetrical amperes at 240 VAC or 208 VAC.
    - b. Fully Rated Systems: Provide circuit breakers with interrupting capacity not less than the short circuit current rating indicated.
  - 3. Conductor Terminations:
    - a. Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
  - 4. Thermal Magnetic Circuit Breakers: For each pole, furnish thermal inverse time tripping element for overload protection and magnetic instantaneous tripping element for short circuit protection.
  - 5. Provide the following circuit breaker types where indicated:
    - a. Ground Fault Circuit Interrupter (GFCI) Circuit Breakers: Listed as complying with UL 943, class A for protection of personnel.

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**PART 3 - EXECUTION**

**3.1 INSTALLATION**

- A. Perform work in accordance with NECA 1 (general workmanship).
- B. Install products in accordance with manufacturer's instructions.
- C. Install panelboards in accordance with NECA 407 and NEMA PB 1.1.
- D. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- E. Provide required support and attachment in accordance with Section 260529.
- F. Mount panelboards such that the highest position of any operating handle for circuit breakers or switches does not exceed 79 inches (2000 mm) above the floor or working platform.
- G. Provide minimum of six spare 1 inch (27 mm) trade size conduits out of each flush-mounted panelboard stubbed into accessible space above ceiling and below floor.
- H. Provide grounding and bonding in accordance with Section 260526.
- I. Provide filler plates to cover unused spaces in panelboards.

END OF SECTION 262416

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SECTION 262726 - WIRING DEVICES

PART 1 - GENERAL

1.1 SUBMITTALS

1.2 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Products: Listed, classified, and labeled as suitable for the purpose intended.

PART 2 - PRODUCTS

2.1 WIRING DEVICE APPLICATIONS

- A. Provide wiring devices suitable for intended use and with ratings adequate for load served.
- B. For single receptacles installed on an individual branch circuit, provide receptacle with ampere rating not less than that of the branch circuit.
- C. Provide weather resistant GFCI receptacles with specified weatherproof covers for receptacles installed outdoors or in damp or wet locations.
- D. Provide tamper resistant receptacles for receptacles installed in dwelling units.
- E. Provide GFCI protection for receptacles installed within 6 feet (1.8 m) of sinks.
- F. Provide GFCI protection for receptacles serving electric drinking fountains.
- G. Unless noted otherwise, do not use combination switch/receptacle devices.

2.2 WIRING DEVICE FINISHES

- A. Provide wiring device finishes as described below unless otherwise indicated.
- B. Wiring Devices, Unless Otherwise Indicated: White with white nylon wall plate.
- C. Wiring Devices Installed in Finished Spaces: White with white nylon wall plate.
- D. Wiring Devices Installed in Unfinished Spaces: Gray with galvanized steel wall plate.
- E. Wiring Devices Installed in Wet or Damp Locations: White with specified weatherproof cover.

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2.3 WALL SWITCHES

- A. Wall Switches - General Requirements: AC only, quiet operating, general-use snap switches with silver alloy contacts, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 20 and where applicable, FS W-S-896; types as indicated on the drawings.
- B. Standard Wall Switches: Commercial specification grade, 20 A, 120/277 V with standard toggle type switch actuator and maintained contacts; single pole single throw, double pole single throw, three way, or four way as indicated on the drawings.

2.4 RECEPTACLES

- A. Receptacles - General Requirements: Self-grounding, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 498, and where applicable, FS W-C-596; types as indicated on the drawings.
  - 1. NEMA configurations specified are according to NEMA WD 6.
- B. Convenience Receptacles:
  - 1. Standard Convenience Receptacles: Commercial specification grade, 20A, 125V, NEMA 5-20R; single or duplex as indicated on the drawings.
  - 2. Tamper Resistant Convenience Receptacles: Commercial specification grade, 20A, 125V, NEMA 5-20R, listed and labeled as tamper resistant type; single or duplex as indicated on the drawings.
- C. GFCI Receptacles:
  - 1. GFCI Receptacles - General Requirements: Self-testing, with feed-through protection and light to indicate ground fault tripped condition and loss of protection; listed as complying with UL 943, class A.
  - 2. Standard GFCI Receptacles: Commercial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style.

2.5 WALL PLATES

- A. Wall Plates: Comply with UL 514D.
  - 1. Configuration: One piece cover as required for quantity and types of corresponding wiring devices.
  - 2. Size: Standard.
  - 3. Screws: Metal with slotted heads finished to match wall plate finish.

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**PART 3 - EXECUTION**

**3.1 INSTALLATION**

- A. Perform work in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.
- B. Coordinate locations of outlet boxes provided under Section 260533.16 as required for installation of wiring devices provided under this section.
- C. Install wiring devices in accordance with manufacturer's instructions.
- D. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.
- E. Connect wiring devices by wrapping conductor clockwise 3/4 turn around screw terminal and tightening to proper torque specified by the manufacturer. Where present, do not use push-in pressure terminals that do not rely on screw-actuated binding.
- F. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.

END OF SECTION 262726



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SECTION 265100 - INTERIOR LIGHTING

PART 1 - GENERAL

1.1 SUBMITTALS

- A. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, installed accessories, and ceiling compatibility; include model number nomenclature clearly marked with all proposed features.
  - 1. LED Luminaires:
    - a. Include estimated useful life, calculated based on IES LM-80 test data.

1.2 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.

PART 2 - PRODUCTS

2.1 LUMINAIRE TYPES

- A. Furnish products as indicated in luminaire schedule included on the drawings.

2.2 LUMINAIRES

- A. Provide products that comply with requirements of NFPA 70.
- B. Provide products that are listed and labeled as complying with UL 1598, where applicable.
- C. Provide products listed, classified, and labeled as suitable for the purpose intended.
- D. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.
- E. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, supports, trims, accessories, etc. as necessary for a complete operating system.
- F. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.
- G. Recessed Luminaires:

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1. Ceiling Compatibility: Comply with NEMA LE 4.
2. Luminaires Recessed in Insulated Ceilings: Listed and labeled as IC-rated, suitable for direct contact with insulation and combustible materials.

H. LED Luminaires:

1. Components: UL 8750 recognized or listed as applicable.
2. Tested in accordance with IES LM-79 and IES LM-80.
3. LED Estimated Useful Life: Minimum of 50,000 hours at 70 percent lumen maintenance, calculated based on IES LM-80 test data.

2.3 EXIT SIGNS

- A. Description: Exit signs complying with NFPA 101 and applicable state and local codes, and listed and labeled as complying with UL 924.
- B. Powered Exit Signs: Internally illuminated with LEDs unless otherwise indicated.
  1. Self-Powered Exit Signs:
    - a. Battery: Sealed, maintenance-free, nickel cadmium unless otherwise indicated.

2.4 BALLASTS AND DRIVERS

- A. Dimmable LED Drivers:
  1. Dimming Range: Continuous dimming from 100 percent to five percent relative light output unless dimming capability to lower level is indicated, without flicker.
  2. Control Compatibility: Fully compatible with the dimming controls to be installed.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Coordinate locations of outlet boxes provided under Section 260533.16 as required for installation of luminaires provided under this section.
- B. Install products in accordance with manufacturer's instructions.
- C. Install luminaires securely, in a neat and workmanlike manner, as specified in NECA 500 (commercial lighting) and NECA 502 (industrial lighting).
- D. Provide required support and attachment in accordance with Section 260529.
- E. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.
- F. Recessed Luminaires:

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1. Non-IC Rated Luminaires: Maintain required separation from insulation and combustible materials according to listing.
  2. Luminaires Recessed in Fire-Rated Ceilings: Install using accessories and firestopping materials to meet regulatory requirements for fire rating.
- G. Bond products and metal accessories to branch circuit equipment grounding conductor.
- H. Exit Signs:
1. Unless otherwise indicated, connect unit to unswitched power from same circuit feeding normal lighting in same room or area. Bypass local switches, contactors, or other lighting controls.
- I. Install lamps in each luminaire.

END OF SECTION 265100