

Spokane County Library District Argonne HVAC Upgrades

Construction Documents

**Volume 1 of 1
Divisions 00-26**

Spokane County Library District Argonne Library

4322 N Argonne Rd
Spokane, WA 99212

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PREPARED FOR:

Spokane County Library District
Spokane, WA

June 10, 2025

DIVISION 00

PROCUREMENT AND CONTRACTING

REQUIREMENTS

VOLUME 1

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END OF SECTION



SPOKANE COUNTY LIBRARY DISTRICT
BID INVITATION
PROJECT: ARGONNE HVAC SYSTEMS
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NOTICE IS HEREBY GIVEN that bids will be received by Spokane County Library District through its electronic bid management system or on paper at 4322 N Argonne Rd, Spokane WA 99212 for the following:

Argonne HVAC Systems Replacement Project

UNTIL: 1:30 PM Tuesday, September 9, 2025

At which time and place the bids will be publicly opened, and read aloud. Late submittals will not be considered.

Spokane County Library District is requesting bids for the Argonne HVAC Systems Replacement project, located at 4322 N Argonne Rd, Spokane Washington 99212.

This project primarily includes: Replacement of the existing chiller and chilled water pumps; Replacement of the existing boiler and hot water pumps; Revision of existing air handling units; Installation of new terminal units; Installation and/ or replacement of motorized dampers; replacement in place of the building service panelboard, and replacement of electrical branch circuits serving the above listed mechanical equipment. Cutting, patching, and painting of interior and exterior components of the building as required to properly integrate and conceal the new work, and replacement of exterior door and frame. A complete description is included in the accompanying bid documents.

Electronic copies of the bid documents are available at no charge in PDF format; see the Bid Posting page at <https://www.sclld.org/about/request-for-proposals/> or on the District's electronic bid management system to download. Documents will be available from August 8, 2025 to September 9, 2025. If you are unable to download the bid documents from the website or electronic bid portal, contact Finance at FN_purchasing@sclld.org (preferred), or phone (509) 893-8210.

Questions regarding the bid should be submitted in writing through the electronic bid management system or to Jason Link at FN_purchasing@sclld.org by August 26, 2025, and answers will be uploaded to the electronic bid management system and posted on the library's website within 5 business days of the questions deadline.

It is required that all bidders attend a pre-bid walk-through on August 19, 2025. Bidders are asked to register for the walk-through by contacting Jason Link, Finance Director, at FN_purchasing@sclld.org (preferred), or phone (509) 893-8210.

Publication Date(s): August 8, 2025.



SPOKANE COUNTY LIBRARY DISTRICT
NOTICE TO BIDDERS FORM
PROJECT: ARGONNE HVAC SYSTEMS
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The following is applicable to non-federal aid projects of Spokane County Library District (District). The District notifies all Bidders that it will affirmatively insure that in any contract entered into pursuant to this advertisement, minority business enterprises will be afforded full opportunity to submit bids in response to this invitation and will not be discriminated against on the grounds of race, color, creed, religion, sex, age, national origin, marital status, disability, sexual orientation, or veteran status, and all other protected classes in the law, in consideration for an award.

All bid proposals must be made on the attached proposal forms and must be accompanied by a bid proposal deposit in an amount equal to five percent (5%) of the amount of the bid proposal. Certified check, cashier's check, or surety bond are acceptable forms of bid deposit.

Should the successful Bidder fail to enter into a contract and furnish a satisfactory payment and performance bonds within the time stated in the specifications, the bid proposal bond will be forfeited to the District.

District reserves the right to the following:

- Accept the proposal of the lowest responsive and responsible bidder.
- Reject any or all bids.
- Republish the call for bids.
- Revise or cancel the work to be performed or do the work otherwise, if in the judgment of the District's Contract Administrator, the best interest of Spokane County Library District is better served.
- Waive any irregularities.

The District also reserves the right to postpone the bid award for a period of thirty (30) calendar days after the bid opening, except that upon mutual consent of the lowest responsible bidder and the District, the 30-calendar day limit may be extended to allow legislative approval of the bid award. If it is anticipated that the award of the contract will be delayed beyond 30-days from bid opening, all bid bonds, except the lowest two will be returned.

The District reserves the right to award the contract to the lowest responsive / responsible bidder based on the total cost of the BASE BID if determined to be in the best interest of the District.

Award will be made to the lowest responsive and responsible Bidder.

Questions

Direct questions in writing to:



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Jason Link, Finance Director, FN_purchasing@sclld.org



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BID INSTRUCTIONS SUPPLEMENTAL
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Supplemental Bid Instructions for Request For Proposals (RFP) related to Argonne HVAC Systems Replacement Project.

Scope of Work

The Contractor agrees to provide all necessary labor to perform the following services for the Spokane County Library District (District or Owner). The Contractor acknowledges this is a Public Work as defined in RCW 39.04.010(4) and agrees to comply with all relevant provisions of that chapter in performing this work, including but not limited to, providing retainage, filing an intent and paying the prevailing wages as required by that chapter.

This project primarily includes: Replacement of the existing chiller and chilled water pumps; Replacement of the existing boiler and hot water pumps; Revision of existing air handling units; Installation of new terminal units; Installation and/ or replacement of motorized dampers; replacement in place of the building service panelboard, and replacement of electrical branch circuits serving the above listed mechanical equipment. Cutting, patching, and painting of interior and exterior components of the building as required to properly integrate and conceal the new work, and replacement of exterior door and frame. A complete description is included in the accompanying bid documents. New equipment should be right-sized based on current operating conditions for the Argonne Library as specified in the architectural drawings and plans.

Schedule or Timeline

The District has set the following schedule for the bidding and selection process.

RFP issued	August 8, 2025
RFP available for pickup	August 8, 2025
Examination of building	August 26, 2025
Requests for clarification due	September 3, 2025
Bids due	September 9, 2025
Board of Trustees meeting	September 16, 2025
Contract due	October 6, 2025

Preparation of Proposal

Each bid proposal must be submitted on the forms included in the “Bid Proposal forms” section of the bid document. All blank spaces on the form must be completed in ink or be typewritten. Any omission of prices for items included on the Bid Form or any addition in writing or any condition or limitation or provision not officially invited in these contract



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documents may render the proposal as being incomplete or modified and may become cause for rejection of the bid.

The total bid price must be shown in both words and figures. The sum shown for the Bid "Total" (total bid price) will be the amount for which the Bidder offers to perform, and agrees to accept for the work described in these documents. At the option and direction of the District Representative, work may be added or deleted in accordance with the contract provisions hereunder.

Bidders must fill in and complete the information requested on the "Bidder Identification" form, including address and telephone number. Include in the form the legal name under which the firm or Bidder registered.

Bid proposals must be signed in full by the person or person legally authorized to bind the bidder to a contract. A bid by a corporation shall further give the state of incorporation and have the corporate seal affixed. A bid submitted by an agent shall have attached a current power of attorney certifying the agent's authority to bind the Bidder. The name of each person signing shall be typed or printed below the signature.

Bid Opening

All responses, received on time and at the correct place, will be opened. The District will decide when the specified time has arrived for the bid opening.

Late bids will not be considered. It is the Bidder's responsibility to deliver the bid to the proper address by the assigned time. The District accepts no responsibility for misdirected or lost bids.

Pre-Bid Project Walk-through

It is required that all bidders attend the pre-bid walk-through. To register for the site walk-through and to receive parking instructions, contact Jason Link, Finance Director at FN_purchasing@sclld.org.

Due to the ongoing nature of the District's operations, access to the building will be restricted and opportunities to inspect the building will be limited to two scheduled site visits. Access to the non-public areas of this site, other than the guided walkthroughs on the two dates identified below, is prohibited.

A formal pre-proposal walkthrough of the District facility covered in this RFP will be held on dates and times listed below. Prospective bidders are required to attend the Orientation



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Walkthrough prior to submitting a bid. This is mandatory for any prime bidder and any HVAC mechanical contractor listed as a subcontractor on the prime bidder's Subcontractor List.

Orientation Walk-through

The Architect and Engineer will accompany the Owner in a walk-through of the project and will be available to answer questions on the project. The walk-through will attempt to visit all areas of work in an orderly fashion.

Location: 4322 N. Argonne Road, Spokane, WA 99212-1853

Date	Time	Purpose
August 26, 2025	9:00 AM	Orientation Walk-through

Required Subcontractors

The bidder is required to use Control Solutions Northwest as the Energy Management and Control System Contractor. Control Solutions Northwest will specify the Schneider based Energy Management Systems software and hardware for consistency with other Spokane County Library District facilities.

The bidder acknowledges that it will coordinate with the owner for Absco related to door access control replacement.

Request for Clarification

Requests for clarification or interpretation concerning this RFP shall be made in writing, by email to FN_purchasing@sclcd.org by 1:00 p.m., on the date listed within this request. All clarifications to this RFP will be communicated in writing to all bidders that have provided contact information for this purpose. No oral clarifications or interpretations will be provided to any bidder.

Bid Proposal Guarantee

A bid bond in the amount of 5% of the total bid is to be submitted in the form of a cash, certified check, bank cashier's check or a surety bond, shall be made payable to Spokane County Library District. A surety bond shall be submitted with the Bid Bond Form that is included in the Bid Proposal Forms section that follows. Surety to have an A.M. Best rating of A:VII or better. **Failure to submit a bid bond will be considered cause to reject a bid.**



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In the event of the withdrawal of this bid proposal after the receipt and opening of bid proposals, or the failure of the Bidder to enter into a contract and give the required contract bond and insurance certification within 20-calendar days after the date of contract award, the Bidder shall be liable to Spokane County Library District for the amount of 5% of the total amount of bid as liquidated damages due to the default of the Bidder.

Bidder Responsibility Criteria

It is the intent of the District to award a contract to the low responsible bidder. Before award, the bidder must meet the following bidder responsibility criteria in RCW 39.04.350 to be considered a responsible bidder. The bidder may be required by the District to submit documentation demonstrating compliance with the criteria. The bidder must:

1. Have a current certificate of registration as a contractor in compliance with RCW 18.27, which must have been in effect at the time of bid submittal;
2. Have:
 - a. A certificate of registration in compliance with chapter RCW 18.27,
 - b. A plumbing contractor license in compliance with chapter RCW 18.106,
 - c. An elevator contractor license in compliance with chapter RCW 70.87,
 - d. Or an electrical contractor license in compliance with chapter RCW 19.28, as required under the provisions of those chapters.
3. Have a current Washington Unified Business Identifier (UBI) number;
4. Have:
 - a. Industrial Insurance (workers' compensation) coverage for the bidder's employees working in Washington, as required in RCW Title 51;
 - b. A Washington Employment Security Department number, as required in RCW Title 50;
 - c. A Washington Department of Revenue state excise tax registration number, as required in RCW Title 82;
5. Not be disqualified from bidding on any public works contract under RCW 39.06.010 or 39.12.065(3).
6. For public works projects subject to the apprentice utilization requirements of 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 RCW chapter 49.04 for the one-year period immediately preceding the first date of advertising for the project.



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7. Have completed at least one public works project within the previous three years and have not received a citation for a violation of RCW chapter 39.04, RCW chapter 39.12, or those provided in RCW 39.12.055 (1) through (3) during that same time period; or (ii) have at least one designated person who is a current employee or officer and who has received training on the requirements related to public works and prevailing wage under this chapter and RCW chapter 39.12 within the previous three years. The training must be provided by the department of labor and industries or by a training provider whose curriculum is approved by the department.
8. Within the three-year period immediately preceding the date of the bid solicitation, not have been 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 to have willfully violated, as defined in RCW 49.48.082, any provision of chapter 49.46, 49.48, or 35 49.52 RCW.
9. At the time of bid submittal, not be subject to a revocation of a minor work permit under RCW 49.12.390(4).
10. Until December 31, 2019, not have violated more than one time the off -site, prefabricated, non- standard, project specific items reporting requirements of RCW 39.04.370.

Bid Submission Requirements

All designations and prices shall be fully and clearly set forth and shall include all applicable federal, state, and local taxes. All designations and prices shall be clearly and fully set forth in the bid and shall include the following.

- Bid Proposal Form (Exhibit A – 004100-01)
- Bid Proposal Signature and Addendum Acknowledgement Form (Exhibit B – 004100-02)
- Bid Bond Form (Exhibit C – 004100-03) optional
- Bidder Identification Form (Exhibit D – 004100-04)
- Subcontractor Identification Form (Exhibit E – 004100-05)
- Statement of Contractor's Qualifications (Exhibit F – 004100-06)
- Non-Collusion and Affidavit Form (Exhibit G – 004100-07)
- Prevailing Wage Rate Notice (Exhibit H – 004100-08)
- Prevailing Wage Rate Form (Exhibit I – 004100-09)
- Compliance with Wage Payment Statutes & Minor Work Permit Certification (Exhibit J – 004100-10)
- Contractor Apprenticeship Program Form (Exhibit K – 004100-11)
- HVAC Systems Replacement Contract (Exhibit L – 005200-01)
- Contract General Terms and Conditions (Exhibit M – 007200-01)



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Retainage Investment Option Form (Exhibit N – 007300-01)
Retainage Escrow Agreement (Exhibit O – 007300-02) optional
Payment Bond (Exhibit P – 007300-03)
Performance Bond (Exhibit Q – 007300-04)
Liquidated Damages Form (Exhibit R – 007300-05)
Project Drawings (Exhibit S)
Project Specifications (Exhibit T)
Certificate of Insurance

(all of which, including any addendums issued, with this RFP, shall constitute “Contract Documents”).

The Spokane County Library District shall not, under any circumstances, be responsible for any costs or expenses associated with any bid submitted including, but not limited to, research, investigation, development, preparation, duplication, production, collation, packaging, delivery, transmittal, or presentation of the bid or any other related information, data, documentation, and material.

The bid shall identify the full business address of the contractor and be signed by an authorized employee or owner of that business. When requested by the District, satisfactory evidence of the authority of the individual signing on behalf of the contractor shall be furnished. Erasures or other changes in the bid must be explained or noted over the signature of the contractors.

Submittal of Proposal

Written bids shall be submitted in a sealed envelope with the words “ARGONNE HVAC SYSTEMS REPLACEMENT CONTRACT BID” on it. Bids for the work specified herein will be received at the office of Spokane County Library District, located at 4322 N Argonne Rd, Spokane WA 99212, until 1:30 PM, Tuesday, September 9, 2025.

Electronic bids may be submitted by email with a subject line of “ARGONNE HVAC SYSTEMS REPLACEMENT CONTRACT BID”. Bids for the work specified herein will be received at the following address: FN_purchasing@sclld.org. All electronic bids, and other documents required to be submitted with the proposal must be in PDF format. Bids will be accepted until 1:30 PM, Tuesday, September 9, 2025.

Bid proposals must be received at the designated location prior to the time and date for receipt of bid proposals, as indicated in the “Invitation to Bid” or any revised date as may be specified by an addendum.



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Bids received prior to this time will be kept unopened in a secure place. The Spokane County Library District will decide when the specified time has arrived and no bid received thereafter will be considered.

Administrative Services Office hours are: Monday through Friday 9:30 AM – 4:00 PM.

No oral, telephone, or faxed submitted bids or modifications will be considered. No alternative bids will be considered.

It is the submitter's responsibility to deliver the document to the proper address by the assigned time. Spokane County Library District accepts no responsibility for lost or misdirected submittals.

Spokane County Library District reserves the right to reject any or all proposals and to waive any irregularities and/or informalities. Spokane County Library District reserves the right to award a contract solely on the written proposal submittal.

Withdrawal of Bids

Bids may be withdrawn upon receipt of a written request received from bidders prior to the time fixed for bid submissions. Negligence on the part of the bidder in preparing the bid confers no right for the withdrawal of the bid after the bid submission time has been reached.

Interpretations and Corrections

If the Bidder finds any discrepancy in or omission from the specifications or plans or if there is any doubt as to their meaning, the Bidder shall promptly notify the Owner Representative. Any addenda issued during the time of bidding will be numbered consecutively and will be incorporated into these contract documents. It is the Bidder's responsibility to ascertain prior to submittal of a bid proposal that all addenda issued have been received, and are acknowledged on the "Bid Proposal Signature and Addendum Acknowledgement" form. Failure to do so will be at the bidder's own risk and the bidder cannot secure relief on the plea of error in the bid.

Funds

This project is financed with Spokane County Library District (local) funds only.

State Sales Tax and Use Tax

Spokane County Library District is required to pay all applicable State and local taxes.



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Consideration of Bids

Bid proposals will be opened and read at the time and place indicated in the "Invitation to Bid" or in an addendum, unless Spokane County Library District has withdrawn the request for bids. After a bid selection has been made, all submitted bid information will be recorded and available to the public for inspection. No oral or telephonic bids or modifications will be considered.

In the event of any discrepancies, the amount shown in the words shall have precedence. In the event that an alternate bid items or items are provided for on the Bid Form, any item for which no bid is intended shall be marked "N/A" for the proposal to be considered complete. Any interlineations, alterations, or erasure must be initialed by the Bidder for the proposal to be considered. It is the intent of Spokane County Library District to award a Contract to the responsible Bidder providing the lowest bid and demonstrating successful prior experience in similar projects provided the bid proposal has been submitted in accordance with the requirements of these contract documents and does not exceed the funds available.

Evaluations of Bids and Bid Award

The contract for Bid #2025-01, Argonne HVAC Systems Replacement, if it is awarded, will be awarded to the lowest responsive/responsible Bidder based on Spokane County Library District's evaluation of the information in the Bid Proposal, and such additional information as Spokane County Library District may require.

Each proposal will be independently evaluated by a committee comprised of representatives of Spokane County Library District and the District's architect and/or engineer. The committee will use the evaluation criteria below to rank the proposing bidders.

Review of bids will include supplemental criteria, which includes Spokane County Library District procurement policies and procedures; any or all bids may be rejected for good cause. If all bids are not rejected, the award shall be to the most responsive bidder. In determining which is the most responsive bidder, Spokane County Library District may take into consideration the total bid, bidder's responsiveness to Spokane County Library District's requirements, the quality of the articles to be purchased or leased, availability of parts and service, delivery time, timeline for completion of the work, experience of contractor (including skill level, qualifications, and equipment familiarity) and prior dealing with the bidder.

Examples of prior dealings with the bidder include, but are not limited to, the bidders past performance of providing materials or services to the Spokane County Library District, either



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through direct- or sub-contracts on a Spokane County Library District related project. Prior dealings may also include the evaluation of the bidder's compliance of contract requirements, including but not limited to, timeliness, submittals, quality of work, budget constraints, meeting deadlines and budgets, competent and professional use of project management tools, such as requests for information, change order proposals, cooperative meetings, coordination of trades, detailed and updated schedules, overall quality of completed works, and references.

Should Spokane County Library District determine that a bidder does not meet the requirements of a responsive and responsible bidder pursuant to RCW 39.04.350, including special criteria and the purchasing policies and procedures, the County will notify the bidder in writing, with the reason(s) for the determination. The bidder may appeal the determination within two (2) business days by presenting additional information to Spokane County Library District. Spokane County Library District will consider the additional information before issuing its final determination. If the final determination affirms that the bidder is not responsible, Spokane County Library District may not and will not execute the contract with any other bidder until two (2) business days after the bidder determined to be not responsible has received the final determination.

No additional compensation will be allowed for other categories of labor or for labor rates in excess of those shown on the Bid Proposals form, unless such categories are approved by Spokane County Library District's representative and the rates for those categories conform to the local prevailing wage rates as determined by the State of Washington Department of Labor and Industries.

Evidence of Qualifications

Before award of a public works contract, a bidder must meet at least the minimum qualifications of RCW 39.04.350 to be considered a responsible bidder and qualified to be awarded a public works project.

In determining the most responsible bidder, Spokane County Library District may consider prior Spokane County Library District projects with the bidder and any other projects in which the bidder was involved as a supervisor, principle, agent, or owner of the company performing the project. The Contractor shall demonstrate successful completion of at least three (3) projects within the last five (5) years that are similar in scope, time, and complexity to the work called for under this contract, and at least two (2) of the projects shall have been completed for a public agency in Washington. Contractor shall have service facilities within 50 miles of Project.



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In addition, the supervisory and lead personnel shall have successfully performed and completed similar project work.

The prime bidder must also be licensed as a general contractor or HVAC contractor in good standing with the State of Washington. General Contractors and/or HVAC Contractors must be regularly engaged for at least the previous ten (10) consecutive years in providing commercial HVAC installation services.

Upon request of Spokane County Library District, a Bidder whose proposal is under consideration for contract award shall promptly submit satisfactory evidence of financial resources, experience, organization, and equipment that the Bidder has available for the performance of this Contract. This shall also apply for each proposed subcontractor.

Additionally, effective July 23, 2017, before award of a public works contract, the bidder and subcontractors under consideration for award of a public works project must submit to the public agency a sworn statement that they have not willfully violated wage payment laws within the past three (3) years in order to be considered a responsible bidder (See RCW 39.04.350 as modified by SSB 5301, Laws of 2017, Ch. 258). A Certification of Compliance with Wage Payment Statutes Form (Exhibit I – 004100-09) must be submitted to Spokane County Library District prior to award.

Award of Contract

It is the intent of Spokane County Library District to make an award within 30-calendar days after the opening of bids to the Bidder deemed most responsible by Spokane County Library District, as provided for hereunder. Except, upon mutual consent of the lowest responsible Bidder and Spokane County Library District, the 30-calendar day limit may be extended.

Retainage

Retainage will be administered in accordance with RCW 60.28, as amended, and in accordance with the "Retainage Investment Option" form (Exhibit N – 007300-01), made part of these contract documents.

Execution of Contract

The successful Bidder shall execute and return the contract, retainage investment option form, retainage escrow agreement if applicable, and furnish performance and payment bonds on the forms set forth in these contract documents, said performance and payment bonds shall be done in a manner satisfactory to Spokane County Library District within 20-calendar days after



SPOKANE COUNTY LIBRARY DISTRICT
BID INSTRUCTIONS SUPPLEMENTAL
PROJECT: ARGONNE HVAC SYSTEMS
REPLACEMENT

bid award. A certificate of insurance satisfying the contract specifications shall be submitted with the signed contract.

Funding Availability

By responding to this RFP, each bidder acknowledges that for any contract signed as a result of this RFP, the authority to proceed with the work is contingent upon the availability of funding by Spokane County Library District.

Statutory Requirements

The Contractor shall comply with the following:

1. RCW 9.18.120 through .150, prohibiting suppression of competitive bidding.
2. RCW 18.27, relating to Contractor's Registration, especially RCW 18.27.111, prohibiting contracts with unregistered contractors, and RCW 18.27.110, relating to issuance of building permits.
3. RCW 36.32.240 through .250, relating to competitive bidding on public works materials and supplies, and contractor's bond.
4. RCW 39.04, relating to public works.
5. RCW 39.06, relating to public works registration and licensing of contractors.
6. RCW 39.08, relating to contractor's bonds.
7. RCW 39.12 and 49.46, relating to minimum and prevailing wages, resident employees, and penalties.
8. RCW 49.12 and 49.28, relating to hours of labor, and female and child labor.
9. RCW 49.60, relating to discrimination.
10. RCW 51.12, relating to workmen's compensation, and employment covered under State Industrial Insurance, especially RCW 51.12, .050 and .070, relating to liability for payments into Industrial Insurance accident fund; and RCW 50.24.130, as to unemployment compensation contributions.
11. RCW 60.28, relating to liens for labor, materials, taxes and retained percentage in connection with public works projects. Except as provided in Section 1-07.1 of the Standard Specifications, all costs incurred as a result of compliance with Federal, State, and local rules and regulations shall be paid by the Contractor and all such costs, including taxes, permit, and other fees, shall be included in the respective bid item amounts.



SPOKANE COUNTY LIBRARY DISTRICT
BID INSTRUCTIONS SUPPLEMENTAL
PROJECT: ARGONNE HVAC SYSTEMS
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Prohibition Against Lobbying

No bidder shall lobby, directly or indirectly, the District Board of Trustees or staff regarding this RFP or its bid. Violation of this provision, by or on behalf of a bidder, intentionally or unintentionally, will result in disqualification of the bidder and/or rejection of its bid.

Wages

Wage rates for work performed under this contract are governed by the Washington State Department of Labor and Industries. No workman, laborer, or mechanic employed in the performance of any part of this contract shall be paid less than the "prevailing rate of wage" as determined by the Industrial Statistician of the Department of Labor and Industries.

Current prevailing State wage data may be obtained from the Industrial Statistician upon request. The request must include the contract title, County in which the contract is located and occupations by general description (e.g., carpenters, electricians, laborers, etc.) to be used in the contract. Request may be mailed to:

Department of Labor and Industries, Employment Standards Division General Administration Building,
Olympia, Washington 98504 Telephone: (360) 753-4019 <https://secure.lni.wa.gov/wagelookup/>

In accordance with provisions of Section 39.12.040 of the Revised Code of Washington (RCW), each voucher claim for payment on a project estimate shall state that the prevailing wages have been paid in accordance with the pre-filed statement(s) of intent to pay prevailing wages on file with Spokane County Library District.

Attention is called to Section 296-127-040 and 296-127-045 of the Washington State Administrative Code that require fee payments to the Washington State Department of Labor and Industries for processing of statements of intent to pay prevailing wages and affidavits of wages paid.

No claim for additional compensation will be allowed for the Contractor because of any payments in excess of the prevailing rates, or for any fees. The Contractor must adjust all disputes in regard to payment of wages in excess of those specified in this contract.

Payment for Work Performed

The Contractor must submit to Spokane County Library District a monthly statement of work performed. This statement must give the actual quantity and cost of the completed work as listed in the awarded contract bid proposal or by executed change order.



SPOKANE COUNTY LIBRARY DISTRICT
BID INSTRUCTIONS SUPPLEMENTAL
PROJECT: ARGONNE HVAC SYSTEMS
REPLACEMENT

The Contractor must submit this to Spokane County Library District no later than the 5th day of the month following the month in which the work was complete.

Spokane County Library District will process and issue warrants for the completed work by the end of the month in which the statement was submitted. Bills submitted later than the above date will be paid at the end of the next month or within 60 days.

Subcontracting

Spokane County Library District reserves the right to approve all subcontractors prior to authorization of the performance of work.

A Subcontractor or an Agent to the Subcontractor will not be permitted to perform any work under the contract until the following documents have been completed and submitted to the Owner Representative:

1. Request to Sublet Work (Exhibit E – 004100-05)
2. Statement of Intent to Pay Prevailing Wages (Exhibit I – 004100-09)

The Contractor's records pertaining to the requirements of this special provision must be open to inspection or audit by representatives of the Owner during the life of the contract and for a period of not less than three (3) years after the date of acceptance of the contract. The Contractor must retain these records for that period. The Contractor must also guarantee that the records of all Subcontractors and Agents will be open to similar inspection or audit for the same period.

Items of Work

Spokane County Library District reserves the right to, and may at its option, delete any bid item or items, or any portion of the work, or otherwise select the item or items of work, as incorporated herein, to be performed under this contract. No additional compensation will be allowed as a result of any such deletion or selection. Spokane County Library District also reserves the right to modify the items of work, or to add such additional items of work as may be determined necessary by and be approved by the Owner Representative.

Pre-Construction Conference

The successful bidder, prior to commencement of work, must attend a pre-construction conference with the Owner Representative, and the Spokane County Library District's Owners Representative for daily oversight of contract administration.



SPOKANE COUNTY LIBRARY DISTRICT
BID INSTRUCTIONS SUPPLEMENTAL
PROJECT: ARGONNE HVAC SYSTEMS
REPLACEMENT

Hours of Work

All work will be performed during working hours: Monday through Friday, between 8:00 AM and 6:00 PM, unless noted otherwise. Contractor and Owner shall coordinate off-hours and weekend work as required to maintain phased public access and limited employee work areas as noted in the Contract Drawings.

Schedule of Work

Work start date shall be coordinated between the selected contractor and the Owner Representative. Tentative Notice to Proceed date is scheduled for on or about October 15, 2025. Refer to Section 01 10 00 – Summary of Work for estimated schedule dates.

Progress of Work

The intent of this contract is to have this project completed in its entirety within the specified working days. Contract time will begin at a time mutually agreed upon by the Owner Representative and the Contractor.

Permits

The contractor shall coordinate with Spokane County Library District for all required approvals and permits prior to proceeding with the installation and work. In cases in which the Scope of Work and the applicable Building Code conflict, Building Code shall prevail.

Uniforms and Badges

Spokane County Library District requires that all contractor's staff wear uniforms with company name or logo, or at a minimum, wear sufficiently conspicuous identification badges at all times.

Substitutions

No substitutions of materials, products, or equipment will be considered prior to receipt of bids unless the Owner Representative has received a written request for approval at least ten days prior to the date for receipt of bids. Such requests must include the name of materials or equipment for which it is to be substituted and a complete description of the proposed substitution including drawings, performance and test data, and any other information necessary for evaluation. Spokane County Library District's decision of approval or disapproval of a proposed substitution will be final. Should a substitution be found acceptable an addendum to the bid will be distributed to all bidders and document holders.



SPOKANE COUNTY LIBRARY DISTRICT
BID INSTRUCTIONS SUPPLEMENTAL
PROJECT: ARGONNE HVAC SYSTEMS
REPLACEMENT

Clean-Up

At all times, the Contractors must keep the site of work free of any accumulation of waste material or rubbish caused by their employees or by their operations in the performance of the work. At the completion of the work, the Contractor must remove all garbage, tools, and materials from and about the site of work. Leave the work place, and its immediate vicinity clear for day to day operations of Spokane County Library District. All costs incurred by the Contractor in complying with the requirements of this section must be considered part of the contract bid items and no additional compensation will be allowed.

Disposition of Removed Equipment and Scrap

Unless otherwise provided, any equipment removed shall be and become the property of Spokane County Library District and shall be disposed of in such a manner as Spokane County Library District may direct. Scrap and/or salvage to be removed during the period of work will be and become the property of the Contractor unless provided otherwise herein. When calculating this bid, the Contractor shall take into consideration the value of such scrap.

Removals

In the event the Contractor requires the removal of tools, material, garbage, or any part thereof, the Contractor shall be responsible for the removal of any dirt or debris required by the Contract. All such work and materials as specified herein shall be to the satisfaction of Spokane County Library District's representative. All such costs incurred by the Contractor for the work and materials under this section shall be considered a part of the contract and no additional compensation will be allowed. All material disposed must be legally documented and certifications of disposal must be provided to Spokane County Library District.

Non-Collusion

The bidder must certify that their firm has not entered into any agreement of any nature whatsoever to fix, maintain, increase or reduce the prices or competition regarding the items covered in this Request for Proposal. Bidder is to complete the attached Non-collusion affidavit (Exhibit G – 004100-07) and submit it with the proposal.

Non-Discrimination

Spokane County Library District requires that no person shall, on the grounds of race, religion, color, national origin, sex, age, marital status, political affiliation, sexual orientation, or the presence of any sensory, mental or physical disability be excluded from participation in, be



SPOKANE COUNTY LIBRARY DISTRICT
BID INSTRUCTIONS SUPPLEMENTAL
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denied the benefits of, or be otherwise subjected to discrimination under any program or activity. Spokane County Library District further assures that every effort will be made to ensure non-discrimination in all of its programs and activities, whether those programs are federally funded or not.

In addition to nondiscrimination compliance requirements, the bidder ultimately awarded a contract shall comply with federal, state and local laws, statutes and ordinances relative to the execution of the work. This requirement includes, but is not limited to, protection of public and employee safety and health; environmental protection; waste reduction and recycling; the protection of natural resources; permits; fees; taxes; and similar subjects.

Other Special Conditions

Public Records: Once submitted to Spokane County Library District, proposals shall become the property of Spokane County Library District, and all proposals shall be deemed public records as defined in Chapter 42.56 RCW, Washington's Public Records Act ("PRA"). Any proposal containing language which purports to copyright the proposal, declares the entire proposal to be confidential, declares that the document is the exclusive property of the proposer, or is any way contrary to the PRA or this proposal, could be removed from consideration. Spokane County Library District does not accept responsibility for determining what the proposer may consider confidential or proprietary. Therefore, any information in the proposal that the proposer claims confidential and/or proprietary or otherwise exempt from disclosure under RCW 42.56.270 or any other provision of the PRA must be clearly designated as described in the "Proprietary Material Submitted" section above. It must also include the exemption(s) from disclosure upon which the proposer is making the claim, and the pages and portions thereof must be clearly marked and identified. With the exception of lists of prospective proposers, and except to the extent otherwise required by law, Spokane County Library District will not disclose proposals until a bid selection is made. At that time, all information about the competitive procurement will be available with the exception of: portions of a proposal specifically designated as confidential and/or proprietary and therefore exempt from disclosure under the PRA until such time as the proposer has a reasonable opportunity to seek a court order preventing such disclosure.

News Release: Mention of Spokane County Library District in advertising, customer lists, photographs, or articles in the professional literature pertaining to an award resulting from bids made in response to this invitation is prohibited without prior written approval from Spokane County Library District.

PART 1 GENERAL

1.1 SUMMARY

A. Documents Include:

1. Owner Provided Existing Drawings.

B. Available Project information has been furnished by Owner to Architect/Engineer for use in designing this Project.

1. Each bidder shall be fully familiar with these documents which have been prepared for Owner by his separate consultant.
2. Such data is offered solely for reference and shall not be considered part of Contract Documents. Data contained in Documents prepared by Owner's separate consultants is believed to be reliable; however, Owner and Architect do not guarantee their accuracy or completeness.
3. In preparing his bid, each bidder shall consider and evaluate data contained in above documents as well as Drawings and Project Manual prepared by Architect.

1.2 EXISTING AS BUILT DRAWINGS

A. Documents from existing building are available for reference only.

B. Drawings will be made available through the Owner.

PART 2 PRODUCTS

2.1 NOT USED

PART 3 EXECUTION

3.1 NOT USED

END OF SECTION



SPOKANE COUNTY LIBRARY DISTRICT
BID PROPOSAL FORM
PROJECT: ARGONNE HVAC SYSTEMS
REPLACEMENT

Submission of this completed form is due with return of signed bid documents. Failure to sign and submit this form will result in the bid being nonresponsive.

To: Spokane County Library District

This certifies that the Undersigned has examined the location of the project site and the conditions of work; and has carefully read and thoroughly understands the contract documents entitled: **"ARGONNE HVAC SYSTEMS REPLACEMENT"** Spokane County Library District, including the "Bid Procedures and Conditions", "Specifications and Conditions", "Contract Forms", "Appendices", and "Plans", governing the work embraced in this project, and the method by which payment will be made for said work. The Undersigned hereby proposes to undertake and complete the work embraced in this project in accordance with said contract documents, and agrees to accept as payment for said work, the schedule of lump sum and unit prices as set forth in the "Bid" below. The Undersigned acknowledges that payment will be based on the actual work performed and material used as measured or provided for in accordance with the said contract documents, and that no additional compensation will be allowed for any taxes not included in each lump sum or unit price, and that the basis for payment will be the actual work performed and measured or provided for in accordance with the said contract documents. The Undersigned certifies that it is not currently disqualified from bidding on any public works contract under RCW 39.06.010, RCW 39.12.055 or RCW 39.12.065(3).

Company Name of Bidder _____

BASE BID – ARGONNE HVAC SYSTEMS REPLACEMENT	
Materials Total	\$
Labor Total	\$
Base Bid Subtotal	\$
Sales Tax Rate (8.9%)	\$
Total Base Bid	\$

Written Total Base Bid Amount

Signature

Date

Name

Title



SPOKANE COUNTY LIBRARY DISTRICT
BID PROPOSAL SIGNATURE AND ADDENDUM
ACKNOWLEDGEMENT FORM
PROJECT: ARGONNE HVAC SYSTEMS
REPLACEMENT

Submission of this completed form is due with return of signed bid documents. Failure to sign and submit this form will result in the bid being nonresponsive.

The bidder is hereby advised that by signature of this proposal he/she is deemed to have acknowledged all requirements and signed all certificates contained herein. The undersigned hereby agrees to pay labor not less than the prevailing rates of wages or less than the hourly minimum rate of wages as specified in the Specifications and Conditions for this project.

A proposal guaranty in the amount of five percent (5%) of the total bid, based upon the approximate estimate of quantities at the above process and in the form as indicated below, is attached hereto:

☐ CASH IN THE AMOUNT OF \$ _____

☐ CASHIER'S CHECK (\$ _____ dollars)

☐ CERTIFIED CHECK (\$ _____ dollars) PAYABLE TO SPOKANE COUNTY
LIBRARY DISTRICT

☐ PROPOSAL BOND IN THE AMOUNT OF 5% OF THE BID

Receipt is hereby acknowledged by Addendum(s) No.(s) _____, _____, & _____

SIGNATURE OF AUTHORIZED OFFICIAL(S)

(PROPOSAL MUST BE SIGNED) _____

NAME: _____

FIRM NAME: _____

STATE OF WASHINGTON)
) ss.
COUNTY OF _____)

On this _____ day of _____, 20____, before me personally appeared _____ to me personally known to be the person described in and who executed the above instrument and who acknowledged to me the act of signing thereof.



SPOKANE COUNTY LIBRARY DISTRICT
BID PROPOSAL SIGNATURE AND ADDENDUM
ACKNOWLEDGEMENT FORM
PROJECT: ARGONNE HVAC SYSTEMS
REPLACEMENT

Print Name: _____

NOTARY PUBLIC in and for the State of Washington, residing at:

My commission expires _____

This proposal form is not transferable and any alteration of the firm's name entered hereon without prior permission from Spokane County Library District will be cause for considering the proposal irregular and for subsequent rejection of the bid.



SPOKANE COUNTY LIBRARY DISTRICT
BOND – BID FORM
PROJECT: ARGONNE HVAC SYSTEMS REPLACEMENT

Surety to have an **A.M. Best** rating of A:VII or better.

Bond No. _____

KNOW ALL PERSONS BY THESE PRESENTS, that we, _____
_____ of _____, as principal, and the
_____ a corporation duly organized under the laws of the State of
_____ and having its principal place of business at

in the State of Washington, as Surety, are held and firmly bound unto Spokane County Library District, a Municipal Corporation in the State of Washington, in the full and penal sum of five percent (5%) of the total bid amount appearing on the bid proposal of said principal for the work hereinafter described, for the payment of which, well, and truly to be made, we bind our heirs, executors, administrators and assigns, and successors and assigns, jointly and severally, firmly by these presents.

The condition of this bond is such that, whereas, the principal herein is herewith submitting his or its bid proposal for **ARGONNE HVAC SYSTEMS REPLACEMENT** bid proposal, by reference thereto, being hereby made a part thereof.

NOW, THEREFORE, if the said bid proposal submitted by the said PRINCIPAL be accepted, and the contract be awarded to said PRINCIPAL, and if said PRINCIPAL shall duly make and enter into and execute said contract and shall furnish the performance bond as required by the bidding and contract documents within a period of ten (10) days from and after said award, exclusive of the day of such award, the its obligation to pay the above- mentioned penal sum as liquidated damages shall be null and void, otherwise it shall remain and be in full force and effect.

SIGNED AND SEALED this _____ day of _____, 20____.

Principal

By _____

(Seal)

Surety

BY _____

Attorney-in-Fact



SPOKANE COUNTY LIBRARY DISTRICT
BOND – BID FORM
PROJECT: ARGONNE HVAC SYSTEMS REPLACEMENT

The Attorney-in-fact who executes this bond on behalf of the surety company, must attach a copy of his power- of-attorney as evidence of his authority.

SAMPLE



SPOKANE COUNTY LIBRARY DISTRICT
BIDDER IDENTIFICATION FORM
PROJECT: ARGONNE HVAC SYSTEMS
REPLACEMENT

Submission of this completed form is due with return of signed bid documents. Failure to sign and submit this form will result in the bid being nonresponsive.

The name of the Bidder submitting this proposal, the address and phone number to which all communications concerned with this proposal shall be made and the number which has been assigned indicating the Bidder is licensed to do business in the State of Washington are as follows:

Firm Name: _____

Address: _____

Telephone: _____

Email: _____

Website: _____

Contractor's WA Registration Number: _____

Contractor's UBI Number: _____

Contractor's WA Employment Security Department Number: _____

Contractor's WA Excise Tax Registration Number: _____

Contractor's WA General Contractor License Number: _____

Contractor's WA Electrical Contractor License Number: _____

Contractor's WA HVAC Contractor License Number: _____

Contractor's WA Plumbing Contractor License Number: _____

Contractor's WA Elevator Contractor License Number: _____

The Firm submitting this proposal is a: _____

☐ Sole Proprietorship

☐ Partnership

☐ Corporation



SPOKANE COUNTY LIBRARY DISTRICT
BIDDER IDENTIFICATION FORM
PROJECT: ARGONNE HVAC SYSTEMS
REPLACEMENT

The names and titles of the principal officers of the corporation submitting this proposal, of the partnership, or of all persons interested in this proposal as principals are as follows:

Name	Title
_____	_____
_____	_____
_____	_____

NOTE: Signators of this proposal must be identified above. Failure to identify the Signators will be cause for considering the proposal irregular and for subsequent rejection of the bid.

_____	_____
Signature	Date
_____	_____
Name	Title

A public works contractor must verify responsibility criteria for each first tier subcontractor, and a subcontractor of any tier that hires other subcontractors must verify responsibility criteria for each of its subcontractors. Verification shall include that each subcontractor, at the time of subcontract execution, meets the responsibility criteria listed in RCW 39.04.350(1) and possesses an electrical contractor license, if required by chapter 19.28 RCW, an elevator contractor license, if required by chapter 70.87 RCW, or a plumbing contractor license, if required by chapter 18.106 RCW. This verification requirement, as well as the responsibility criteria, must be included in every public works contract and subcontract of every tier.



SPOKANE COUNTY LIBRARY DISTRICT
SUBCONTRACTOR IDENTIFICATION FORM
PROJECT: ARGONNE HVAC SYSTEMS
REPLACEMENT

Submission of this completed form is due with return of signed bid documents. Failure to sign and submit this form will result in the bid being nonresponsive.

Prepared in Compliance with RCW 39.30.060, as amended.

To be submitted with, or as a supplement to, the Bid Proposal for **ARGONNE HVAC SYSTEMS REPLACEMENT**, as applicable, and in accordance with RCW 39.30.060:

Failure to submit, as follows, the names of Subcontractors will result in the bidder's bid being non-responsive and therefore void:

- a. The names of the subcontractors with whom the bidder, if awarded the contract, will subcontract for performance of the work of: HVAC (heating, ventilation, and air conditioning); plumbing as described in chapter 18.106 RCW; and electrical as described in chapter 19.28 RCW, or to name itself for the work must be submitted at the time of the bid submittal; and
- b. Within forty-eight (48) hours after the published bid submittal time, the names of the subcontractors with whom the bidder, if awarded the contract, will subcontract for performance of the work of structural steel installation and rebar installation.

Errors identified by the awarding contracting agency in the proof of license information must be corrected by the bidder within 48 hours of submission.

If a Subcontractors List is submitted as a supplement after the bid submittal time as described above, the list must be emailed to FN_purchasing@sclcd.org or delivered to:

Spokane County Library District
Attn: Jason Link, Finance Director
4322 N Argonne Rd
Spokane, WA 99212

To the extent the Project includes one (1) or more categories of work referenced in RCW 39.30.060, and no subcontractor is listed below to perform such work, the bidder certifies that the work will either (i) be performed by the bidder itself, or (ii) be performed by a lower tier subcontractor who will not contract directly with the bidder.

CATEGORY OF WORK	SUBCONTRACTOR NAME
HVAC	
Plumbing	
Electrical	



SPOKANE COUNTY LIBRARY DISTRICT
SUBCONTRACTOR IDENTIFICATION FORM
PROJECT: ARGONNE HVAC SYSTEMS
REPLACEMENT

Structural Steel Installation	
Rebar Installation	

* Bidders are notified that it is the opinion of the enforcement agency that PVC or metal conduit, junction boxes, etc., are considered electrical equipment and therefore considered part of electrical work, even if the installation is for future use and no wiring or electrical current is connected during the project.

_____ Signature	_____ Date
_____ Name	_____ Title

(Bidders may submit their own version of this form or attach additional sheets as necessary)

A public works contractor must verify responsibility criteria for each first tier subcontractor, and a subcontractor of any tier that hires other subcontractors must verify responsibility criteria for each of its subcontractors. Verification shall include that each subcontractor, at the time of subcontract execution, meets the responsibility criteria listed in RCW 39.04.350(1) and possesses an electrical contractor license, if required by chapter 19.28 RCW, an elevator contractor license, if required by chapter 70.87 RCW, or a plumbing contractor license[,] if required by chapter 18.106 RCW. This verification requirement, as well as the responsibility criteria, must be included in every public works contract and subcontract of every tier.



SPOKANE COUNTY LIBRARY DISTRICT
CONTRACTOR QUALIFICATIONS FORM
PROJECT: ARGONNE HVAC SYSTEMS
REPLACEMENT

Submission of this completed form is due with return of signed bid documents. Failure to sign and submit this form will result in the bid being nonresponsive.

Contractors must document adequate experience with and knowledge of general construction and HVAC installation/replacement of similar size and scope to the proposed project. Prime contractor should include information for any subcontractors.

List at least three (3) projects completed within the last five (5) years, or under way on this date, that are similar in scope, time, and complexity to the work to be performed under this contract, and at least two (2) of the projects shall have been completed for a public agency in Washington. In addition, the supervisory, lead, and project management personnel shall have successfully performed and completed similar project work.

The Undersigned certifies under oath that the information provided related to the Contractor's Qualifications is true and sufficiently complete and was performed by the Contractors identified.

Month/Year Contract Started	Contract Amount	Type of Work	Contractor	Customer Name and Address	Customer Contact Name and Telephone Number
	\$				
	\$				
	\$				
	\$				
	\$				

On supplemental materials, Contractors will also identify the following information:

- For Contractor/Subcontractor:
 - How long Contractor has been in business.



SPOKANE COUNTY LIBRARY DISTRICT
CONTRACTOR QUALIFICATIONS FORM
PROJECT: ARGONNE HVAC SYSTEMS
REPLACEMENT

- Any former business name(s) & dates of operation.
 - Reason for name or changes.
- For each Project:
 - Identify the architect/engineer
 - Identify the project manager by name, provide experience
 - Identify the superintendent by name, provide experience
 - Identify the original contract amount, final contract amount
 - Identify the original contract days, extension granted days and the completion date

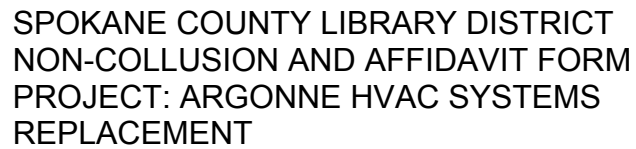
Signature

Date

Name

Title

(Bidders may submit their own version of this form or attach additional sheets as necessary.)



I, the Undersigned, an authorized representative of _____
_____, being first duly sworn on oath do hereby certify that said person(s), firm, association or corporation has (have) not, either directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of free competitive bidding in connection with the project for which this proposal is submitted. I further acknowledge that by signing the proposal signature page of the proposal, I am deemed to have signed and have agreed to the provisions of this non-collusion affidavit.

Date _____

Title _____

On this ____ day of _____, 2025, before me personally appeared _____ to me personally known to be the person described in and who executed the above instrument and who acknowledged to me the act of signing thereof.

My commission expires _____



SPOKANE COUNTY LIBRARY DISTRICT
PREVAILING WAGE RATE NOTICE FORM
PROJECT: ARGONNE HVAC SYSTEMS
REPLACEMENT

State of Washington
Department of Labor & Industries
Prevailing Wage Section – Telephone 855-545-8163
PO Box 44540, Olympia WA 98504-4540

The PREVAILING WAGES listed here include both the hourly wage rate and the hourly rate of fringe benefits. On public works projects, worker's wage and benefit rates must add to not less than this total. A brief description of overtime calculation requirements are provided on the Benefit Key Code, located at:

https://lni.wa.gov/licensing-permits/public-works-projects/_docs/benefitcodekey20251.pdf

Journey Level Prevailing Wage Rates Spokane County

Apprentice Level Prevailing Wage Rates Spokane County

(Effective August 8, 2025)

Following is a link to the Prevailing Wage Rates. Categories of rates are listed on the Washington State Department of Labor and Industries website at:

<https://secure.lni.wa.gov/wagelookup/>



SPOKANE COUNTY LIBRARY DISTRICT
PREVAILING WAGE RATE FORM
PROJECT: ARGONNE HVAC SYSTEMS
REPLACEMENT

Submission of this completed form is due with return of signed bid documents. Failure to sign and submit this form will result in the bid being nonresponsive.

The Undersigned Bidder hereby acknowledges that the information furnished under this section will be considered in conjunction with the "Bid" price above, in the evaluation of bids for contract award.

Categories and Rates of Labor

The Undersigned Bidder certifies that all work to be performed under this Contract will be performed by the following Department of Labor and Industries prevailing wage rate classifications of labor with the rates as shown. The Undersigned agrees to accept as payment for said work the schedule of labor classifications and rates as set forth below.

Classification	Rate

Signature

Date

Name

Title



SPOKANE COUNTY LIBRARY DISTRICT
CERTIFICATION OF COMPLIANCE WITH WAGE
PAYMENT STATUTES & MINOR WORK PERMIT
FORM

PROJECT: ARGONNE HVAC SYSTEMS
REPLACEMENT

Submission of this completed form is due with return of signed bid documents. Failure to sign and submit this form will result in the bid being nonresponsive.

The bidder hereby certifies that, within the three-year period immediately preceding the bid solicitation date **August 8, 2025**, the bidder is not 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 judgement entered by a court of limited or general jurisdiction.

The bidder hereby certifies that at the time of bid submittal, it is not subject to a revocation of a minor work permit under RCW 49.12.390(4).

I certify under penalty of perjury under the laws of the State of Washington that the foregoing is true and correct.

Bidder's Business Name

Bidder's Registration Certificate Number

Signature of Authorized Official*

Date

Printed Name

Title

City

State

Check One:

Sole Proprietorship ☐ Partnership ☐ Joint Venture ☐ Corporation ☐

State of Incorporation, or if not a corporation, State where business entity was formed:

If a co-partnership, give firm under which business name is transacted:



SPOKANE COUNTY LIBRARY DISTRICT
CERTIFICATION OF COMPLIANCE WITH WAGE
PAYMENT STATUTES & MINOR WORK PERMIT
FORM

PROJECT: ARGONNE HVAC SYSTEMS
REPLACEMENT

**If a corporation, proposal must be executed in the corporate name by the president or vice-president (or any other corporate officer accompanied by evidence of authority to sign). If a co-partnership, proposal must be executed by a partner.*



SPOKANE COUNTY LIBRARY DISTRICT
CONTRACTOR APPRENTICESHIP PROGRAM
FORM
PROJECT: ARGONNE HVAC SYSTEMS
REPLACEMENT

Submission of this completed form is due with return of signed bid documents. Failure to sign and submit this form will result in the bid being nonresponsive.

This project may meet the threshold for Contractor Apprenticeship Program (CAP) in RCW 39.04.320 with a minimum apprenticeship utilization requirement of 15% of total labor hours. If awarded the contract for this project the bidder may be required to comply with **RCW 39.04.320**. The Spokane County Library District encourages Contractors to early adopt utilization requirement in RCW 39.04.320(1)(ii).

Compliance with the requirements of this requirement will be verified through certified payroll and Affidavits of Wages Paid filed with Washington State Labor and Industries. I certify that I have read the requirements of **Contractor Apprenticeship Training Programs (RCW 39.04.32)** and attest that our work on this contract will comply with the requirements as applicable.

If the project is subject to the Contractor Apprenticeship Program, the bidder certifies that it has 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.

For a project subject to apprentice utilization requirements under RCW 39.04.320, the bidder shall submit an apprentice utilization plan to the awarding agency before receiving the notice to proceed.

Signature

Printed Name

Date

DRAFT AIA® Document A104® – 2017

Standard Abbreviated Form of Agreement Between Owner and Contractor

AGREEMENT made as of the « » day of « » in the year 2025
(In words, indicate day, month and year.)

BETWEEN the Owner:
(Name, legal status, address and other information)

Spokane County Library District
4322 N Argonne Road

Spokane, WA 99212

and the Contractor:

(Name, legal status, address and other information)

« »« »

« »

« »

« »

for the following Project:
(Name, location and detailed description)

ARGONNE HVAC SYSTEMS REPLACEMENT
4322 N Argonne Road

Spokane, WA 99212

The Architect:

(Name, legal status, address and other information)

«Integrus Architecture »« »

«10 S Cedar St »

«Spokane, WA 99201

The Owner and Contractor agree as follows.

ADDITIONS AND DELETIONS:

The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

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ARTICLE 1 THE WORK OF THIS CONTRACT

The Contractor shall execute the Work described in the Contract Documents, except as specifically indicated in the Contract Documents to be the responsibility of others.

ARTICLE 2 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

§ 2.1 The date of commencement of the Work shall be:

(Check one of the following boxes.)

☐ The date of this Agreement.

☐ A date set forth in a notice to proceed issued by the Owner.

- ☒ Established as follows:
(Insert a date or a means to determine the date of commencement of the Work.)

Contractor shall commence the Work within 15 days after the Owner issues a written notice to proceed.

If a date of commencement of the Work is not selected, then the date of commencement shall be the date of this Agreement.

§ 2.2 The Contract Time shall be measured from the date of commencement.

§ 2.3 Substantial Completion

§ 2.3.1 Subject to adjustments of the Contract Time as provided in the Contract Documents, the Contractor shall achieve Substantial Completion of the entire Work:

(Check the appropriate box and complete the necessary information.)

☐ Not later than () calendar days from the date of commencement of the Work.

☒ By the following date: On or before , 2025, in accordance with the Contract Documents

§ 2.3.2 Subject to adjustments of the Contract Time as provided in the Contract Documents, if portions of the Work are to be completed prior to Substantial Completion of the entire Work, the Contractor shall achieve Substantial Completion of such portions by the following dates:

Portion of Work

If any, as set forth in the Contract Documents

Substantial Completion Date

If any, as set forth in the Contract Documents

§ 2.3.3 If the Contractor fails to achieve Substantial Completion as provided in this Section 2.3, liquidated damages, if any, shall be assessed as set forth in Section 3.5.

ARTICLE 3 CONTRACT SUM

§ 3.1 The Owner shall pay the Contractor the Contract Sum in current funds for the Contractor's performance of the Contract. The Contract Sum shall be one of the following:

(Check the appropriate box.)

☒ Stipulated Sum, in accordance with Section 3.2 below

☐ Cost of the Work plus the Contractor's Fee, in accordance with Section 3.3 below

☐ Cost of the Work plus the Contractor's Fee with a Guaranteed Maximum Price, in accordance with Section 3.4 below

(Based on the selection above, complete Section 3.2, 3.3 or 3.4 below.)

§ 3.2 The Stipulated Sum shall be (\$), subject to additions and deductions as provided in the Contract Documents.

§ 3.2.1 The Stipulated Sum is based upon the following alternates, if any, which are described in the Contract Documents and are hereby accepted by the Owner:

(State the numbers or other identification of accepted alternates. If the bidding or proposal documents permit the Owner to accept other alternates subsequent to the execution of this Agreement, attach a schedule of such other alternates showing the amount for each and the date when that amount expires.)

« »

§ 3.2.2 Unit prices, if any:

(Identify the item and state the unit price and the quantity limitations, if any, to which the unit price will be applicable.)

Item	Units and Limitations	Price per Unit (\$0.00)
N/A		

§ 3.2.3 Allowances, if any, included in the stipulated sum:

(Identify each allowance.)

Item	Price
N/A	

§ 3.3 Cost of the Work Plus Contractor's Fee

§ 3.3.1 The Cost of the Work is as defined in Exhibit A, Determination of the Cost of the Work.

§ 3.3.2 The Contractor's Fee:

(State a lump sum, percentage of Cost of the Work or other provision for determining the Contractor's Fee and the method of adjustment to the Fee for changes in the Work.)

N/A

§ 3.4 Cost of the Work Plus Contractor's Fee With a Guaranteed Maximum Price

§ 3.4.1 The Cost of the Work is as defined in Exhibit A, Determination of the Cost of the Work.

§ 3.4.2 The Contractor's Fee:

(State a lump sum, percentage of Cost of the Work or other provision for determining the Contractor's Fee and the method of adjustment to the Fee for changes in the Work.)

N/A

§ 3.4.3 Guaranteed Maximum Price

§ 3.4.3.1 The sum of the Cost of the Work and the Contractor's Fee is guaranteed by the Contractor not to exceed « » (\$ « »), subject to additions and deductions by changes in the Work as provided in the Contract Documents. This maximum sum is referred to in the Contract Documents as the Guaranteed Maximum Price. Costs which would cause the Guaranteed Maximum Price to be exceeded shall be paid by the Contractor without reimbursement by the Owner.

(Insert specific provisions if the Contractor is to participate in any savings.)

N/A

§ 3.4.3.2 The Guaranteed Maximum Price is based on the following alternates, if any, which are described in the Contract Documents and are hereby accepted by the Owner:

(State the numbers or other identification of accepted alternates. If the bidding or proposal documents permit the Owner to accept other alternates subsequent to the execution of this Agreement, attach a schedule of such other alternates showing the amount for each and the date when that amount expires.)

N/A

§ 3.4.3.3 Unit Prices, if any:

(Identify the item and state the unit price and the quantity limitations, if any, to which the unit price will be applicable.)

Item	Units and Limitations	Price per Unit (\$0.00)
N/A		

§ 3.4.3.4 Allowances, if any, included in the Guaranteed Maximum Price:

(Identify each allowance.)

Item

N/A

Price

§ 3.4.3.5 Assumptions, if any, on which the Guaranteed Maximum Price is based:

N/A

§ 3.4.3.6 To the extent that the Contract Documents are anticipated to require further development, the Guaranteed Maximum Price includes the costs attributable to such further development consistent with the Contract Documents and reasonably inferable therefrom. Such further development does not include changes in scope, systems, kinds and quality of materials, finishes or equipment, all of which, if required, shall be incorporated by Change Order.

§ 3.4.3.7 The Owner shall authorize preparation of revisions to the Contract Documents that incorporate the agreed-upon assumptions contained in Section 3.4.3.5. The Owner shall promptly furnish such revised Contract Documents to the Contractor. The Contractor shall notify the Owner and Architect of any inconsistencies between the agreed-upon assumptions contained in Section 3.4.3.5 and the revised Contract Documents.

§ 3.5 Liquidated damages, if any:

(Insert terms and conditions for liquidated damages, if any.)

Timely performance and completion of the Work is essential to the 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.

The liquidated damages 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 payments otherwise due to the Contractor.

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

Liquidated damages may be assessed at \$1000 per calendar day for each day beyond the Substantial Completion date that the Work remains unperformed or incomplete.

ARTICLE 4 PAYMENT

§ 4.1 Progress Payments

§ 4.1.1 Based upon Applications for Payment submitted to the Architect by the Contractor and Certificates for Payment issued by the Architect, the Owner shall make progress payments on account of the Contract Sum to the Contractor as provided below and elsewhere in the Contract Documents. By submitting an Application for Payment, Contractor is certifying that all Subcontractors have been paid, less earned retainage in accordance with applicable law, including but not limited to RCW 60.28.011, as their interests appeared in the last preceding certificate of payment.

§ 4.1.2 The period covered by each Application for Payment shall be one calendar month ending on the last day of the month, or as follows:

« »

§ 4.1.3 Provided that an Application for Payment is received by the Architect and Owner (or Owner's delegee designated in writing by Owner) not later than the 15th day of a month, the Owner shall make payment of the certified amount to the Contractor not later than the 1st day of the following month. If an Application for Payment is received by the Architect after the date fixed above, payment shall be made by the Owner not later than fifteen (15) days after the Architect receives the Application for Payment.

(Federal, state or local laws may require payment within a certain period of time.)

§ 4.1.4 For each progress payment made prior to Substantial Completion of the Work, the Owner may withhold retainage from the payment otherwise due as follows:

(Insert a percentage or amount to be withheld as retainage from each Application for Payment and any terms for reduction of retainage during the course of the Work. The amount of retainage may be limited by governing law.)

Options for retainage: Owner shall retain five percent (5.00%) of the amount of each progress payment until 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 chapter 60.28 RCW, 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. Contractor must submit the "Retainage Investment Option Form" expressing electing its choice of handling retainage. Contractor shall submit an invoice for retainage after final acceptance of the work by the Owner or following receipt of Washington State Department of Labor & Industries / Revenue / Employment Security, which ever takes longer. Retainage on landscaping work may be retained longer, due to its seasonal nature. State law allows for limited early release in certain circumstances.

Owner may permit Contractor to provide an appropriate bond in lieu of the retained funds. With the consent of the Owner, the Contractor may submit a bond for all or any portion of the amount of funds retained by the Owner in a form and from an authorized surety insurer acceptable to the Owner. Such bond and any proceeds therefrom shall be made subject to all claims and liens and in the same manner and priority as set forth for retained percentages in this chapter. The Owner shall release the bonded portion of the retained funds to the Contractor within thirty days of accepting the bond from the Contractor. Whenever the Owner accepts a bond in lieu of retained funds from a Contractor, the Contractor shall accept like bonds from any Subcontractors or suppliers from which the Contractor has retained funds. The Contractor shall then release the funds retained from the Subcontractor or supplier to the Subcontractor or supplier within thirty days of accepting the bond from the Subcontractor or supplier.

§ 4.1.5 Payments due under the Contract shall bear interest from the date payment is due and unpaid after 15 days at the rate stated below, or in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

(Insert rate of interest agreed upon, if any.)

One (1.00) percent per month.

§ 4.2 Final Payment

§ 4.2.1 Final payment, constituting the entire unpaid balance of the Contract Sum, shall be made by the Owner to the Contractor when

- .1 the Contractor has fully performed the Contract except for the Contractor's responsibility to correct Work as provided in Section 18.2, and to satisfy other requirements, if any, which extend beyond final payment;
- .2 the Contractor has submitted a final accounting for the Cost of the Work, where payment is on the basis of the Cost of the Work with or without a Guaranteed Maximum Price; and
- .3 a final Certificate for Payment has been issued by the Architect in accordance with Section 15.7.1.

§ 4.2.2 The Owner's final payment to the Contractor shall be made no later than 30 days after the issuance of the Architect's final Certificate for Payment, or as follows:

N/A

ARTICLE 5 DISPUTE RESOLUTION

§ 5.1 Binding Dispute Resolution

§ 5.1.1 For any claim subject to, but not resolved by, mediation pursuant to Section 21.5, the method of binding dispute resolution shall be as follows:

(Check the appropriate box.)

☒ Arbitration pursuant to Section 21.6 of this Agreement

☐ Litigation in a court of competent jurisdiction

☐ Other *(Specify)*

« »

If the Owner and Contractor do not select a method of binding dispute resolution, or do not subsequently agree in writing to a binding dispute resolution method other than litigation, claims will be resolved in a court of competent jurisdiction. If either Owner or Contractor institutes any arbitration, legal suit, action or proceeding against the other party to enforce the Contract Documents, the prevailing party in the suit, action or proceeding shall be entitled to receive, and the non-prevailing party shall pay, in addition to all other remedies to which the prevailing party may be entitled, the costs and expenses incurred by the prevailing party in connection with the arbitration, legal suit, action or proceeding, including actual attorney's fees, expenses, and court costs, even if not recoverable by law (including, without limitation, all fees, taxes, costs and expenses incident to appellate, bankruptcy and post-judgment proceedings).

§ 5.1.2 In the event that any litigation should arise concerning the construction or interpretation of any of the terms of this Agreement, the venue of such action of litigation shall be in the courts of the State of Washington in and for the County of Spokane. This Agreement shall be governed by the laws of the State of Washington.

ARTICLE 6 ENUMERATION OF CONTRACT DOCUMENTS

§ 6.1 The Contract Documents are defined in Article 7 and, except for Modifications issued after execution of this Agreement, are enumerated in the sections below.

§ 6.1.1 The Agreement is this executed AIA Document A104™–2017, Standard Abbreviated Form of Agreement Between Owner and Contractor.

§ 6.1.2 Building information modeling exhibit, dated as indicated below:

(Insert the date of the building information modeling exhibit incorporated into this Agreement.)

« »

§ 6.1.3 The Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages

§ 6.1.4 The Specifications:

(Either list the Specifications here or refer to an exhibit attached to this Agreement.)

« »

Section	Title	Date	Pages

§ 6.1.5 The Drawings:

(Either list the Drawings here or refer to an exhibit attached to this Agreement.)

« »

Number	Title	Date

§ 6.1.6 The Addenda, if any:

Number	Date	Pages

Portions of Addenda relating to bidding or proposal requirements are not part of the Contract Documents unless the bidding or proposal requirements are enumerated in this Article 6.

§ 6.1.7 Additional documents, if any, forming part of the Contract Documents:

.1 Other Exhibits:

(Check all boxes that apply.)

☐ Exhibit A, Determination of the Cost of the Work.

☐ AIA Document E204™–2017, Sustainable Projects Exhibit, dated as indicated below:
(Insert the date of the E204-2017 incorporated into this Agreement.)

☐

☐ The Sustainability Plan:

Title	Date	Pages

☐ Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages

.2 Other documents, if any, listed below:

(List here any additional documents that are intended to form part of the Contract Documents.)

☐

ARTICLE 7 GENERAL PROVISIONS

§ 7.1 The Contract Documents

The Contract Documents are enumerated in Article 6 and consist of this Agreement (including, if applicable, Supplementary and other Conditions of the Contract), Drawings, Specifications, Addenda issued prior to the execution of this Agreement, other documents listed in this Agreement, and Modifications issued after execution of this Agreement. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive, or (4) a written order for a minor change in the Work issued by the Architect. The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

§ 7.2 The Contract

The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind between any persons or entities other than the Owner and the Contractor.

§ 7.3 The Work

The term “Work” means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment, and services provided or to be provided by the Contractor to fulfill the Contractor’s obligations. The Work may constitute the whole or a part of the Project.

§ 7.4 Instruments of Service

Instruments of Service are representations, in any medium of expression now known or later developed, of the tangible and intangible creative work performed by the Architect and the Architect’s consultants under their respective professional services agreements. Instruments of Service may include, without limitation, studies, surveys, models, sketches, drawings, specifications, and other similar materials.

§ 7.5 Ownership and use of Drawings, Specifications and Other Instruments of Service

§ 7.5.1 The Architect and the Architect’s consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and will retain all common law, statutory and other reserved rights in their Instruments of Service, including copyrights. The Contractor, Subcontractors, Sub-subcontractors, and suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with the Project is not to be construed as publication in derogation of the Architect’s or Architect’s consultants’ reserved rights.

§ 7.5.2 The Contractor, Subcontractors, Sub-subcontractors and suppliers are authorized to use and reproduce the Instruments of Service provided to them, subject to the protocols established pursuant to Sections 7.6 and 7.7, solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and suppliers may not use the Instruments of Service on other projects or for additions to this Project outside the scope of the Work without the specific written consent of the Owner, Architect and the Architect’s consultants.

§ 7.5.3 Ownership of Items Produced

All writings, programs, data, public records, or other materials prepared by the Architect, Contractor and/or its consultants or subcontractors, in connection with performance of this Agreement, shall be the sole and absolute property of the Owner. If the Contractor creates any copyrightable materials or invents any patentable property, the Contractor may copyright or patent the same, but the Owner retains a royalty-free, nonexclusive, and irrevocable license to reproduce, publish, recover, or otherwise use the materials or property and to authorize other governments to use the same for state or local governmental purposes. Contractor further agrees to make research, notes, and other work products produced in the performance of the Agreement available to the Owner upon request.

Ownership. Any and all data, writings, programs, public records, reports, analyses, documents, photographs, pamphlets, plans, specifications, surveys, films, or any other materials created, prepared, produced, constructed, assembled, made, performed, or otherwise produced by the Contractor or the Contractor’s subcontractors or consultants for delivery to the Owner under this Contract shall be the sole and absolute property of the Owner. Such property shall constitute “work made for hire” as defined by the U.S. Copyright Act of 1976, 17 U.S.C. § 101, and the ownership of the copyright and any other intellectual property rights in such property shall vest in the Owner at the time of its creation. Ownership of the intellectual property includes the right to copyright, patent and register, and the ability to transfer these rights. Material which the Contractor uses to perform this Contract but is not created, prepared, constructed, assembled, made, performed, or otherwise produced for or paid for by the Owner is owned by the Contractor and is not “work made for hire” within the terms of this Agreement.

§ 7.6 Digital Data Use and Transmission

The parties shall agree upon written protocols governing the transmission and use of, and reliance on, Instruments of Service or any other information or documentation in digital form.

§ 7.7 Building Information Models Use and Reliance

Any use of, or reliance on, all or a portion of a building information model without agreement to written protocols governing the use of, and reliance on, the information contained in the model shall be at the using or relying party’s sole risk and without liability to the other party and its contractors or consultants, the authors of, or contributors to, the building information model, and each of their agents and employees.

§ 7.8 Severability

The invalidity of any provision of the Contract Documents shall not invalidate the Contract or its remaining provisions. If it is determined that any provision of the Contract Documents violates any law, or is otherwise invalid or unenforceable, then that provision shall be revised to the extent necessary to make that provision legal and enforceable. In such case the Contract Documents shall be construed, to the fullest extent permitted by law, to give effect to the parties' intentions and purposes in executing the Contract.

§ 7.9 Notice

§ 7.9.1 Except as otherwise provided in Section 7.9.2, where the Contract Documents require one party to notify or give notice to the other party, such notice shall be provided in writing to the designated representative of the party to whom the notice is addressed and shall be deemed to have been duly served if delivered in person, by mail, by courier, or by electronic transmission in accordance with a building information modeling exhibit, if completed, or as otherwise set forth below:

(If other than in accordance with a building information modeling exhibit, insert requirements for delivering Notice in electronic format such as name, title and email address of the recipient and whether and how the system will be required to generate a read receipt for the transmission.)

« »

§ 7.9.2 Notice of Claims shall be provided in writing and shall be deemed to have been duly served only if delivered to the designated representative of the party to whom the notice is addressed by certified or registered mail, or by courier providing proof of delivery.

§ 7.10 Relationship of the Parties

Where the Contract is based on the Cost of the Work plus the Contractor's Fee, with or without a Guaranteed Maximum Price, the Contractor accepts the relationship of trust and confidence established by this Agreement and covenants with the Owner to cooperate with the Architect and exercise the Contractor's skill and judgment in furthering the interests of the Owner; to furnish efficient business administration and supervision; to furnish at all times an adequate supply of workers and materials; and to perform the Work in an expeditious and economical manner consistent with the Owner's interests. The Owner agrees to furnish and approve, in a timely manner, information required by the Contractor and to make payments to the Contractor in accordance with the requirements of the Contract Documents.

ARTICLE 8 OWNER

§ 8.1 Information and Services Required of the Owner

§ 8.1.1 Prior to commencement of the Work, at the written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. The Contractor shall have no obligation to commence the Work until the Owner provides such evidence. If commencement of the Work is delayed under this Section 8.1.1, the Contract Time shall be extended appropriately.

§ 8.1.2 The Owner shall furnish all necessary surveys and a legal description of the site.

§ 8.1.3 The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.

§ 8.1.4 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 9.6.1, the Owner shall secure and pay for other necessary approvals, easements, assessments, and charges required for the construction, use, or occupancy of permanent structures or for permanent changes in existing facilities.

§ 8.2 Owner's Right to Stop the Work

If the Contractor fails to correct Work which is not in accordance with the requirements of the Contract Documents, or repeatedly fails to carry out the Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order is eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity.

§ 8.3 Owner's Right to Carry Out the Work

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents, and fails within a ten-day period after receipt of notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to any other remedies the Owner may have, correct such default or neglect. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect and the Architect may, pursuant to Section 15.4.3, withhold or nullify a Certificate for Payment in whole or in part, to the extent reasonably necessary to reimburse the Owner for the reasonable cost of correcting such deficiencies, including the Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect, or failure. If the Contractor disagrees with the actions of the Owner or the Architect, or the amounts claimed as costs to the Owner, the Contractor may file a Claim pursuant to Article 21.

ARTICLE 9 CONTRACTOR

§ 9.1 Review of Contract Documents and Field Conditions by Contractor

§ 9.1.1 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed and correlated personal observations with requirements of the Contract Documents.

§ 9.1.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 8.1.2, shall take field measurements of any existing conditions related to that portion of the Work and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies, or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional unless otherwise specifically provided in the Contract Documents.

§ 9.1.3 The Contractor is not required to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, but the Contractor shall promptly report to the Architect any nonconformity discovered by or made known to the Contractor as a request for information in such form as the Architect may require.

§ 9.2 Supervision and Construction Procedures

§ 9.2.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The 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 under the Contract, unless the Contract Documents give other specific instructions concerning these matters.

§ 9.2.2 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for or on behalf of the Contractor or any of its Subcontractors.

§ 9.3 Labor and Materials

§ 9.3.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

§ 9.3.2 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of unfit persons or persons not skilled in tasks assigned to them.

§ 9.3.3 The Contractor may make a substitution only with the consent of the Owner, after evaluation by the Architect and in accordance with a Modification.

§ 9.4 Warranty

§ 9.4.1 The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation or normal wear and tear under normal usage. All other warranties required by the Contract Documents shall be issued in the name of the Owner, or shall be transferable to the Owner, and shall commence in accordance with Section 15.6.3.

§ 9.4.2 The Contractor shall warrant and guarantee the materials and work to be free of defects for a period of two (2) years after the Owner's final acceptance of the Project. The Contractor shall be liable for any costs, losses, expenses, or damages, including consequential damages, suffered by the Owner resulting from defects in the Work including, but not limited to, the cost of materials and labor expended by the Owner in making any repairs and the cost of engineering, inspection, and supervision by the District. The Contractor shall hold the Owner harmless from any and all claims, which may be made against the Owner as a result of any defective work, and the Contractor shall defend any claims at its own expense. Where materials or procedures are not specified in the Contract Documents, the Owner will rely on the professional judgment of the Contractor to make the appropriate selections.

§ 9.5 Taxes

§ 9.5.1 The Contractor shall pay sales, consumer, use, and other similar taxes that are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect.

§ 9.5.2 The Contractor understands and acknowledges that the Owner will not withhold Federal or State income taxes. Where required by State or Federal law, the Contractor authorizes the Owner to withhold for any taxes other than income taxes (i.e., Medicare). All compensation received by the Contractor will be reported to the Internal Revenue Service at the end of the calendar year in accordance with the applicable IRS regulations. It is the responsibility of the Contractor to make the necessary estimated tax payments throughout the year, if any, and the Contractor is solely liable for any tax obligation arising from the Contractor's performance of this Agreement. The Contractor hereby agrees to indemnify the Owner against any demand to pay taxes arising from the Contractor's failure to pay taxes on compensation earned pursuant to this Agreement.

§ 9.5.3 The Owner will pay sales and use taxes imposed on goods or services acquired hereunder as required by law. The Contractor must pay all other taxes, including, but not limited to, Business and Occupation Tax, taxes based on the Contractor's gross or net income, or personal property to which the Owner does not hold title. The Owner is exempt from Federal Excise Tax.

§ 9.6 Permits, Fees, Notices, and Compliance with Laws

§ 9.6.1 Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit as well as other permits, fees, licenses, and inspections by government agencies necessary for proper execution and completion of the Work that are customarily secured after execution of the Contract and legally required at the time bids are received or negotiations concluded.

§ 9.6.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work. If the Contractor performs Work knowing it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction.

§ 9.7 Allowances

The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. The Owner shall select materials and equipment under allowances with reasonable promptness. Allowance amounts shall include the costs to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts. Contractor's costs for unloading and handling at the site, labor, installation, overhead, profit, and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowance.

§ 9.8 Contractor's Construction Schedules

§ 9.8.1 The Contractor, promptly after being awarded the Contract, shall submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall not exceed time limits current under the Contract Documents, shall be revised at appropriate intervals as required by the conditions of the Work and Project, shall be related to the entire Project to the extent required by the Contract Documents, and shall provide for expeditious and practicable execution of the Work.

§ 9.8.2 The Contractor shall perform the Work in general accordance with the most recent schedule submitted to the Owner and Architect.

§ 9.9 Submittals

§ 9.9.1 The Contractor shall review for compliance with the Contract Documents and submit to the Architect Shop Drawings, Product Data, Samples, and similar submittals required by the Contract Documents in coordination with the Contractor's construction schedule and in such sequence as to allow the Architect reasonable time for review. By submitting Shop Drawings, Product Data, Samples, and similar submittals, the Contractor represents to the Owner and Architect that the Contractor has (1) reviewed and approved them; (2) determined and verified materials, field measurements, and field construction criteria related thereto, or will do so; and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents. The Work shall be in accordance with approved submittals.

§ 9.9.2 Shop Drawings, Product Data, Samples and similar submittals are not Contract Documents.

§ 9.9.3 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents or unless the Contractor needs to provide such services in order to carry out the Contractor's own responsibilities. If professional design services or certifications by a design professional are specifically required, the Owner and the Architect will specify the performance and design criteria that such services must satisfy. The Contractor shall cause such services or certifications to be provided by an appropriately licensed design professional. If no criteria are specified, the design shall comply with applicable codes and ordinances. Each Party shall be entitled to rely upon the information provided by the other Party. The Architect will review and approve or take other appropriate action on submittals for the limited purpose of checking for conformance with information provided and the design concept expressed in the Contract Documents. The Architect's review of Shop Drawings, Product Data, Samples, and similar submittals shall be for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. In performing such review, the Architect will approve, or take other appropriate action upon, the Contractor's Shop Drawings, Product Data, Samples, and similar submittals.

§ 9.10 Use of Site

The Contractor shall confine operations at the site to areas permitted by applicable laws, statutes, ordinances, codes, rules and regulations, lawful orders of public authorities, and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

§ 9.11 Cutting and Patching

The Contractor shall be responsible for cutting, fitting, or patching required to complete the Work or to make its parts fit together properly.

§ 9.12 Cleaning Up

The Contractor shall keep the premises and surrounding area free from accumulation of waste materials and rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery, and surplus material from and about the Project.

§ 9.13 Access to Work

The Contractor shall provide the Owner and Architect with access to the Work in preparation and progress wherever located.

§ 9.14 Royalties, Patents and Copyrights

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner and Architect harmless from loss on account thereof, but shall not be responsible for defense or loss when a particular design, process, or product of a particular manufacturer or manufacturers is required by the Contract Documents or where the copyright violations are contained in Drawings, Specifications or other documents prepared by the Owner or Architect. However, if an infringement of a copyright or patent is discovered by, or made known to, the Contractor, the Contractor shall be responsible for the loss unless the information is promptly furnished to the Architect.

§ 9.15 Indemnification

§ 9.15.1 To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the Owner, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), but only to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss, or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity which would otherwise exist as to a party or person described in this Section 9.15.1.

§ 9.15.2 In claims against any person or entity indemnified under this Section 9.15 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, the indemnification obligation under Section 9.15.1 shall not be limited by a limitation on amount or type of damages, compensation or benefits payable by or for the Contractor or Subcontractor under workers' compensation acts, disability benefit acts or other employee benefit acts.

§ 9.15.3 Should a court of competent jurisdiction determine that this Agreement is subject to RCW 4.24.115, then in the event of concurrent negligence of the Contractor, its subcontractors, employees or agents, and the Owner, its employees or agents, this indemnification obligation of the Contractor shall be valid and enforceable only to the extent of the negligence of the Contractor, its subcontractors, employees, and agents. This indemnification obligation of the Contractor shall not be limited in any way by the Washington State Industrial Insurance Act, RCW Title 51, or by application of any other workmen's compensation act, disability benefit act or other employee benefit act, and the Contractor hereby expressly waives any immunity afforded by such acts.

§ 9.15.4 It is further provided that no liability shall attach to the Owner by reason of entering into this Agreement, except as expressly provided herein. The parties specifically agree that this Agreement is for the benefit of the parties only and this Agreement shall create no rights in any third party. The Owner reserves the right, but not the obligation, to participate in the defense of any claim, damages, losses, or expenses, and such participation shall not constitute a waiver of Contractor's indemnity obligations under this Agreement.

§ 9.15.5 In the event the Contractor enters into subcontracts to the extent allowed under this Agreement, the Contractor's subcontractors shall indemnify the Owner on a basis equal to or exceeding Contractor's indemnity obligations to the Owner. The Contractor shall pay all attorney's fees and expenses incurred by the Owner in establishing and enforcing the Owner's rights under this indemnification provision, whether or not suit was instituted.

§ 9.15.6 The Contractor agrees all Contractor's indemnity obligations shall survive the completion, expiration or termination of this Agreement. The foregoing indemnification obligations of the Contractor are a material inducement to Owner to enter into this Agreement and are reflected in the Contract Sum.

§ 9.15.7 By signing this Agreement, the Contractor acknowledges that it has freely negotiated and agreed to the indemnification requirements to defend, indemnify, and hold harmless the Owner from all claims and suits including those brought against the Owner by the Contractor's own employees, arising from this Agreement.

§ 9.15.8 It is further specifically and expressly understood that the indemnification provided herein constitutes the Contractor's waiver of immunity under Washington's Industrial Insurance, Title 51 RCW, solely for the purpose of this indemnification. This waiver has been mutually negotiated by the parties.

ARTICLE 10 ARCHITECT

§ 10.1 The Architect will provide administration of the Contract as described in the Contract Documents and will be an Owner's representative during construction, until the date the Architect issues the final Certificate for Payment. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents, unless otherwise modified in writing in accordance with other provisions of the Contract.

§ 10.2 Duties, responsibilities, and limitations of authority of the Architect as set forth in the Contract Documents shall not be restricted, modified, or extended without written consent of the Owner, Contractor, and Architect. Consent shall not be unreasonably withheld.

§ 10.3 The Architect will visit the site at intervals appropriate to the stage of the construction to become generally familiar with the progress and quality of the portion of the Work completed, and to determine in general, if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Architect will not have control over, charge of, or responsibility for the construction means, methods, techniques, sequences, or procedures, or for safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents.

§ 10.4 On the basis of the site visits, the Architect will keep the Owner reasonably informed about the progress and quality of the portion of the Work completed, and promptly report to the Owner (1) known deviations from the Contract Documents, (2) known deviations from the most recent construction schedule submitted by the Contractor, and (3) defects and deficiencies observed in the Work. The Architect will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not have control over or charge of and will not be responsible for acts or omissions of the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

§ 10.5 Based on the Architect's evaluations of the Work and of the Contractor's Applications for Payment, the Architect will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts.

§ 10.6 The Architect has authority to reject Work that does not conform to the Contract Documents and to require inspection or testing of the Work.

§ 10.7 The Architect will review and approve or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data, and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.

§ 10.8 The Architect will interpret and decide matters concerning performance under, and requirements of, the Contract Documents on written request of either the Owner or Contractor. The Architect will make initial decisions on all claims, disputes, and other matters in question between the Owner and Contractor but will not be liable for results of any interpretations or decisions rendered in good faith.

§ 10.9 The Architect's decisions on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents.

ARTICLE 11 SUBCONTRACTORS

§ 11.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site.

§ 11.2 Unless otherwise stated in the Contract Documents, the Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the Subcontractors or suppliers proposed for each of the principal portions of the Work. The Contractor shall not contract with any Subcontractor or supplier to whom the Owner or

Architect has made reasonable written objection within ten days after receipt of the Contractor's list of Subcontractors and suppliers. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

§ 11.3 Contracts between the Contractor and Subcontractors shall (1) require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by the terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work, which the Contractor, by the Contract Documents, assumes toward the Owner and Architect, and (2) allow the Subcontractor the benefit of all rights, remedies and redress against the Contractor that the Contractor, by these Contract Documents, has against the Owner.

ARTICLE 12 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

§ 12.1 The term "Separate Contractor(s)" shall mean other contractors retained by the Owner under separate agreements. The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and with Separate Contractors retained under Conditions of the Contract substantially similar to those of this Contract, including those provisions of the Conditions of the Contract related to insurance and waiver of subrogation.

§ 12.2 The Contractor shall afford the Owner and Separate Contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's activities with theirs as required by the Contract Documents.

§ 12.3 The Owner shall be reimbursed by the Contractor for costs incurred by the Owner which are payable to a Separate Contractor because of delays, improperly timed activities, or defective construction of the Contractor. The Owner shall be responsible to the Contractor for costs incurred by the Contractor because of delays, improperly timed activities, damage to the Work, or defective construction of a Separate Contractor.

ARTICLE 13 CHANGES IN THE WORK

§ 13.1 By appropriate Modification, changes in the Work may be accomplished after execution of the Contract. The Owner, without invalidating the Contract, may order changes in the Work within the general scope of the Contract consisting of additions, deletions, or other revisions, with the Contract Sum and Contract Time being adjusted accordingly. Such changes in the Work shall be authorized by written Change Order signed by the Owner, Contractor, and Architect, or by written Construction Change Directive signed by the Owner and Architect. Upon issuance of the Change Order or Construction Change Directive, the Contractor shall proceed promptly with such changes in the Work, unless otherwise provided in the Change Order or Construction Change Directive. If the Contractor determines, for any reason, that a Change Order is necessary, Contractor must submit a written change order request to the Architect within fourteen (14) calendar days of the date Contractor knew or should have known of the facts and events giving rise to the requested change. If the Contractor fails to request a Change Order within the time specified in this paragraph, the Contractor waives its right to make any claim or submit subsequent Change Order requests for that portion of the Work

If the Contractor disagrees with the adjustment of the payment for work or time as set forth in a Change Order, the Contractor must complete the Change Order work; however, the Contractor may elect to protest the adjustment as provided in Section 15.8 and Section XXI, of this Agreement.

§ 13.2 Adjustments in the Contract Sum and Contract Time resulting from a change in the Work shall be determined by mutual agreement of the parties or, in the case of a Construction Change Directive signed only by the Owner and Architect, by the Contractor's cost of labor, material, equipment, and reasonable overhead and profit, unless the parties agree on another method for determining the cost or credit. Pending final determination of the total cost of a Construction Change Directive, the Contractor may request payment for Work completed pursuant to the Construction Change Directive. The Architect will make an interim determination of the amount of payment due for purposes of certifying the Contractor's monthly Application for Payment. When the Owner and Contractor agree on adjustments to the Contract Sum and Contract Time arising from a Construction Change Directive, the Architect will prepare a Change Order.

§ 13.3 The Architect will have authority to order minor changes in the Work not involving adjustment in the Contract Sum or extension of the Contract Time and not inconsistent with the intent of the Contract Documents. Such changes shall be effected by written order and shall be binding on the Owner and Contractor. The Contractor shall carry out such written orders promptly. If the Contractor believes that the proposed minor change in the Work will affect the Contract Sum or Contract Time, the Contractor shall notify the Architect and shall not proceed to implement the change in the Work.

§ 13.4 If concealed or unknown physical conditions are encountered at the site that differ materially from those indicated in the Contract Documents or from those conditions ordinarily found to exist, the Contract Sum and Contract Time shall be equitably adjusted as mutually agreed between the Owner and Contractor; provided that the Contractor provides notice to the Owner and Architect promptly and before conditions are disturbed.

ARTICLE 14 TIME

§ 14.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing this Agreement the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

§ 14.2 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work.

§ 14.3 The term “day” as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

§ 14.4 The date of Substantial Completion is the date certified by the Architect in accordance with Section 15.6.3.

§ 14.5 If the Contractor is delayed at any time in the commencement or progress of the Work by (1) changes ordered in the Work; (2) by labor disputes, fire, unusual delay in deliveries, abnormal adverse weather conditions not reasonably anticipatable, unavoidable casualties, or any causes beyond the Contractor’s control; or (3) by other causes that the Contractor asserts, and the Architect determines, justify delay, then the Contract Time shall be extended for such reasonable time as the Architect may determine, subject to the provisions of Article 21.

ARTICLE 15 PAYMENTS AND COMPLETION

§ 15.1 Schedule of Values

§ 15.1.1 Where the Contract is based on a Stipulated Sum or the Cost of the Work with a Guaranteed Maximum Price pursuant to Section 3.2 or 3.4, the Contractor shall submit a schedule of values to the Architect before the first Application for Payment, allocating the entire Stipulated Sum or Guaranteed Maximum Price to the various portions of the Work. The schedule of values shall be prepared in the form, and supported by the data to substantiate its accuracy required by the Architect. This schedule of values shall be used as a basis for reviewing the Contractor’s Applications for Payment.

§ 15.1.2 The allocation of the Stipulated Sum or Guaranteed Maximum Price under this Section 15.1 shall not constitute a separate stipulated sum or guaranteed maximum price for each individual line item in the schedule of values.

§ 15.2 Control Estimate

§ 15.2.1 Where the Contract Sum is the Cost of the Work, plus the Contractor’s Fee without a Guaranteed Maximum Price pursuant to Section 3.3, the Contractor shall prepare and submit to the Owner a Control Estimate within 14 days of executing this Agreement. The Control Estimate shall include the estimated Cost of the Work plus the Contractor’s Fee.

§ 15.2.2 The Control Estimate shall include:

- .1 the documents enumerated in Article 6, including all Modifications thereto;
- .2 a list of the assumptions made by the Contractor in the preparation of the Control Estimate to supplement the information provided by the Owner and contained in the Contract Documents;
- .3 a statement of the estimated Cost of the Work organized by trade categories or systems and the Contractor’s Fee;

- .4 a project schedule upon which the Control Estimate is based, indicating proposed Subcontractors, activity sequences and durations, milestone dates for receipt and approval of pertinent information, schedule of shop drawings and samples, procurement and delivery of materials or equipment the Owner's occupancy requirements, and the date of Substantial Completion; and
- .5 a list of any contingency amounts included in the Control Estimate for further development of design and construction.

§ 15.2.3 When the Control Estimate is acceptable to the Owner and Architect, the Owner shall acknowledge it in writing. The Owner's acceptance of the Control Estimate does not imply that the Control Estimate constitutes a Guaranteed Maximum Price.

§ 15.2.4 The Contractor shall develop and implement a detailed system of cost control that will provide the Owner and Architect with timely information as to the anticipated total Cost of the Work. The cost control system shall compare the Control Estimate with the actual cost for activities in progress and estimates for uncompleted tasks and proposed changes. This information shall be reported to the Owner, in writing, no later than the Contractor's first Application for Payment and shall be revised and submitted with each Application for Payment.

§ 15.2.5 The Owner shall authorize preparation of revisions to the Contract Documents that incorporate the agreed-upon assumptions contained in the Control Estimate. The Owner shall promptly furnish such revised Contract Documents to the Contractor. The Contractor shall notify the Owner and Architect of any inconsistencies between the Control Estimate and the revised Contract Documents.

§ 15.3 Applications for Payment

§ 15.3.1 At least ten days before the date established for each progress payment, the Contractor shall submit to the Architect an itemized Application for Payment prepared in accordance with the schedule of values, if required under Section 15.1, for completed portions of the Work. The application shall be notarized, if required, be supported by all data substantiating the Contractor's right to payment that the Owner or Architect require; shall reflect retainage if provided for in the Contract Documents; and include any revised cost control information required by Section 15.2.4. Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay a Subcontractor or supplier, unless such Work has been performed by others whom the Contractor intends to pay.

§ 15.3.2 With each Application for Payment where the Contract Sum is based upon the Cost of the Work, or the Cost of the Work with a Guaranteed Maximum Price, the Contractor shall submit payrolls, petty cash accounts, receipted invoices or invoices with check vouchers attached, and any other evidence required by the Owner to demonstrate that cash disbursements already made by the Contractor on account of the Cost of the Work equal or exceed progress payments already received by the Contractor plus payrolls for the period covered by the present Application for Payment, less that portion of the progress payments attributable to the Contractor's Fee.

§ 15.3.3 Payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment stored, and protected from damage, off the site at a location agreed upon in writing.

§ 15.3.4 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information and belief, be free and clear of liens, claims, security interests or other encumbrances adverse to the Owner's interests.

§ 15.4 Certificates for Payment

§ 15.4.1 The Architect will, within seven days after receipt of the Contractor's Application for Payment, either issue to the Owner a Certificate for Payment, with a copy to the Contractor, for such amount as the Architect determines is properly due, or notify the Contractor and Owner of the Architect's reasons for withholding certification in whole or in part as provided in Section 15.4.3.

§ 15.4.2 The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on the Architect's evaluations of the Work and the data in the Application for Payment, that, to the best of the

Architect's knowledge, information, and belief, the Work has progressed to the point indicated, the quality of the Work is in accordance with the Contract Documents, and the Contractor is entitled to payment in the amount certified. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion and to specific qualifications expressed by the Architect. However, the issuance of a Certificate for Payment will not be a representation that the Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work; (2) reviewed construction means, methods, techniques, sequences, or procedures; (3) reviewed copies of requisitions received from Subcontractors and suppliers and other data requested by the Owner to substantiate the Contractor's right to payment; or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

§ 15.4.3 The Architect may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Section 15.4.2 cannot be made. If the Architect is unable to certify payment in the amount of the Application, the Architect will notify the Contractor and Owner as provided in Section 15.4.1. If the Contractor and the Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Section 9.2.2, because of

- .1 defective Work not remedied;
- .2 third-party claims filed or reasonable evidence indicating probable filing of such claims unless security acceptable to the Owner is provided by the Contractor;
- .3 failure of the Contractor to make payments properly to Subcontractors or suppliers for labor, materials or equipment;
- .4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
- .5 damage to the Owner or a Separate Contractor;
- .6 reasonable evidence that the Work will not be completed within the Contract Time and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay;
- or
- .7 repeated failure to carry out the Work in accordance with the Contract Documents.

§ 15.4.4 When either party disputes the Architect's decision regarding a Certificate for Payment under Section 15.4.3, in whole or in part, that party may submit a Claim in accordance with Article 21.

§ 15.5 Progress Payments

§ 15.5.1 The Contractor shall pay each Subcontractor, no later than seven days after receipt of payment from the Owner, the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to sub-subcontractors in a similar manner.

§ 15.5.2 Neither the Owner nor Architect shall have an obligation to pay or see to the payment of money to a Subcontractor or supplier except as may otherwise be required by law.

§ 15.5.3 A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

§ 15.5.4 Provided the Owner has fulfilled its payment obligations under the Contract Documents, the Contractor shall defend and indemnify the Owner from all loss, liability, damage or expense, including reasonable attorney's fees and litigation expenses, arising out of any lien claim or other claim for payment by any Subcontractor or supplier of any tier. Upon receipt of notice of a lien claim or other claim for payment, the Owner shall notify the Contractor. If approved by the applicable court, when required, the Contractor may substitute a surety bond for the property against which the lien or other claim for payment has been asserted.

§ 15.6 Substantial Completion

§ 15.6.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use.

§ 15.6.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

§ 15.6.3 Upon receipt of the Contractor's list, the Architect will make an inspection to determine whether the Work or designated portion thereof is substantially complete. When the Architect determines that the Work or designated portion thereof is substantially complete, the Architect will issue a Certificate of Substantial Completion which shall establish the date of Substantial Completion; establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance; and fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

§ 15.6.4 The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in the Certificate. Upon such acceptance and consent of surety, if any, the Owner shall make payment of retainage applying to the Work or designated portion thereof. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents.

§ 15.7 Final Completion and Final Payment

§ 15.7.1 Upon receipt of the Contractor's notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection and, when the Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's on-site visits and inspections, the Work has been completed in accordance with the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions stated in Section 15.7.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

§ 15.7.2 Final payment shall not become due until the Contractor has delivered to the Owner a complete release of all liens arising out of this Contract or receipts in full covering all labor, materials and equipment for which a lien could be filed, or a bond satisfactory to the Owner to indemnify the Owner against such lien. If such lien remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging such lien, including costs and reasonable attorneys' fees.

§ 15.7.3 The making of final payment shall constitute a waiver of claims by the Owner except those arising from

- .1 liens, claims, security interests or encumbrances arising out of the Contract and unsettled;
- .2 failure of the Work to comply with the requirements of the Contract Documents;
- .3 terms of special warranties required by the Contract Documents; or
- .4 audits performed by the Owner, if permitted by the Contract Documents, after final payment.

§ 15.7.4 Acceptance of final payment by the Contractor, a Subcontractor or supplier shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of the final Application for Payment.

§ 15.8 Protest Process

§ 15.8.1 Procedure and Protest by Contractor. If the Contractor disagrees with anything required by a Change Order, another written order, or an oral order from the Owner, including any direction, instruction, interpretation, or determination by the Owner, the Contractor shall, within fourteen (14) calendar days, provide a signed written notice of protest to the Owner that states the date of the notice of the protest, the nature and circumstances that caused the protest, the provisions of the Contract that support the protest, the estimated dollar cost, if any, of the protested work

and how the estimate was determined, and an analysis of the progress schedule showing the schedule change or disruption, if applicable. The Contractor shall keep complete records of extra costs and time incurred as a result of the protested work. The Owner shall have access to any of the Contractor's records needed to evaluate the protest. If the Owner determines that a protest is valid, the Owner will adjust the payment for work or time by an equitable adjustment.

- A) Failure to Protest or Follow Procedures Constitutes Waiver. By not protesting or failing to follow procedures as this Section provides, the Contractor waives any additional entitlement or claims for protested work, and accepts from the Owner any written or oral order (including directions, instructions, interpretations, and determinations).
- B) Reciprocal Chapter 42.56 RCW rights. Contractor agrees, on behalf of itself and Subcontractors, that any invocation of RCW 42.56 at any time by Contractor or a Subcontractor, or their respective representatives, shall initiate an equivalent right to disclosures from Contractor and Subcontractors for the benefit of Owner. Failure to fully comply with these requirements shall constitute a material breach of the Agreement and shall constitute a waiver of all Claims by Contractor and any Subcontractor that does not fully comply.

ARTICLE 16 PROTECTION OF PERSONS AND PROPERTY

§ 16.1 Safety Precautions and Programs

The Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the performance of the Contract. The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury, or loss to

- .1 employees on the Work and other persons who may be affected thereby;
- .2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody, or control of the Contractor, a Subcontractor, or a Sub-subcontractor; and
- .3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation, or replacement in the course of construction.

The Contractor shall comply with, and give notices required by, applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities bearing on safety of persons and property and their protection from damage, injury, or loss. The Contractor shall promptly remedy damage and loss to property caused in whole or in part by the Contractor, a Subcontractor, a sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 16.1.2 and 16.1.3. The Contractor may make a claim for the cost to remedy the damage or loss to the extent such damage or loss is attributable to acts or omissions of the Owner or Architect or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 9.15.

§ 16.2 Hazardous Materials and Substances

§ 16.2.1 The Contractor is responsible for compliance with the requirements of the Contract Documents regarding hazardous materials or substances. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents, and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and notify the Owner and Architect of the condition. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased in the amount of the Contractor's reasonable additional costs of shutdown, delay, and start-up.

§ 16.2.2 To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work in the affected area, if in fact, the material or substance presents the risk of bodily injury or death as described in Section 16.2.1 and has not been rendered harmless, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), except to the extent that such damage, loss, or expense is due to the fault or negligence of the party seeking indemnity.

§ 16.2.3 If, without negligence on the part of the Contractor, the Contractor is held liable by a government agency for the cost of remediation of a hazardous material or substance solely by reason of performing Work as required by the Contract Documents, the Owner shall indemnify the Contractor for all cost and expense thereby incurred.

ARTICLE 17 INSURANCE AND BONDS

§ 17.1 Contractor's Insurance

§ 17.1.1 The Contractor shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in this Section 17.1 or elsewhere in the Contract Documents. The Contractor shall purchase and maintain the insurance required by this Agreement from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Contractor shall maintain the required insurance until the expiration of the period for correction of Work as set forth in Section 18.4, unless a different duration is stated below:

« »

§ 17.1.2 Commercial General Liability insurance for the Project written on an occurrence form with policy limits of not less than One Million Dollars (\$1,000,000) each occurrence, One Million Dollars (\$1,000,000) general aggregate, and Two Million Dollars (\$ 2,000,000) aggregate for products-completed operations hazard, providing coverage for claims including

- .1 damages because of bodily injury, sickness or disease, including occupational sickness or disease, and death of any person;
- .2 personal and advertising injury;
- .3 damages because of physical damage to or destruction of tangible property, including the loss of use of such property;
- .4 bodily injury or property damage arising out of completed operations; and
- .5 the Contractor's indemnity obligations under Section 9.15.

§ 17.1.3 Automobile Liability covering vehicles owned by the Contractor and non-owned vehicles used by the Contractor, with policy limits of not less than One Million (\$1,000,000) per accident, for bodily injury, death of any person, and property damage arising out of the ownership, maintenance, and use of those motor vehicles along with any other statutorily required automobile coverage.

§ 17.1.4 The Contractor may achieve the required limits and coverage for Commercial General Liability and Automobile Liability through a combination of primary and excess or umbrella liability insurance, provided such primary and excess or umbrella insurance policies result in the same or greater coverage as those required under Section 17.1.2 and 17.1.3, and in no event shall any excess or umbrella liability insurance provide narrower coverage than the primary policy. The excess policy shall not require the exhaustion of the underlying limits only through the actual payment by the underlying insurers.

§ 17.1.5 Workers' Compensation at statutory limits.

§ 17.1.6 Employers' Liability with policy limits not less than One Million (\$1,000,000) each accident, One Million (\$1,000,000) each employee, and One Million (\$1,000,000) policy limit.

§ 17.1.7 If the Contractor is required to furnish professional services as part of the Work, the Contractor shall procure Professional Liability insurance covering performance of the professional services, with policy limits of not less than One Million (\$1,000,000) per claim and One Million (\$1,000,000) in the aggregate.

§ 17.1.8 If the Work involves the transport, dissemination, use, or release of pollutants, the Contractor shall procure Pollution Liability insurance, with policy limits of not less than One Million (\$1,000,000) per claim and Two Million (\$2,000,000) in the aggregate.

§ 17.1.9 Coverage under Sections 17.1.7 and 17.1.8 may be procured through a Combined Professional Liability and Pollution Liability insurance policy, with combined policy limits of not less than One Million (\$1,000,000) per claim and Two Million (\$2,000,000) in the aggregate.

§ 17.1.10 The Contractor shall provide certificates of insurance acceptable to the Owner evidencing compliance with the requirements in this Section 17.1 at the following times: (1) prior to commencement of the Work; (2) upon renewal or replacement of each required policy of insurance; and (3) upon the Owner's written request. An additional certificate evidencing continuation of liability coverage, including coverage for completed operations, shall be submitted with the final Application for Payment and thereafter upon renewal or replacement of such coverage until the expiration of the period required by Section 17.1.1. The certificates will show the Owner as an additional insured on the Contractor's Commercial General Liability and excess or umbrella liability policy.

§ 17.1.11 The Contractor shall disclose to the Owner any deductible or self-insured retentions applicable to any insurance required to be provided by the Contractor.

§ 17.1.12 To the fullest extent permitted by law, the Contractor shall cause the commercial liability coverage required by this Section 17.1 to include (1) the Owner, the Architect, and the Architect's Consultants as additional insureds for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's operations; and (2) the Owner as an additional insured for claims caused in whole or in part by the Contractor's negligent acts or omissions for which loss occurs during completed operations. The additional insured coverage shall be primary and non-contributory to any of the Owner's general liability insurance policies and shall apply to both ongoing and completed operations. To the extent commercially available, the additional insured coverage shall be no less than that provided by Insurance Services Office, Inc. (ISO) forms CG 20 10 07 04, CG 20 37 07 04, and, with respect to the Architect and the Architect's Consultants, CG 20 32 07 04.

§ 17.1.13 Within three (3) business days of the date the Contractor becomes aware of an impending or actual cancellation or expiration of any insurance required by this Section 17.1, the Contractor shall provide notice to the Owner of such impending or actual cancellation or expiration. Upon receipt of notice from the Contractor, the Owner shall, unless the lapse in coverage arises from an act or omission of the Owner, have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by the Contractor. The furnishing of notice by the Contractor shall not relieve the Contractor of any contractual obligation to provide any required coverage.

§ 17.1.14 With respect to the performance of this Agreement and as to claims against the Owner, its officers, agents and employees, the Contractor expressly waives its immunity under Title 51 of the Revised Code of Washington, the Industrial Insurance Act, for injuries to its employees and agrees that the obligations to indemnify, defend and hold harmless provided in this agreement extend to any claim brought by or on behalf of any employee of the Contractor. This waiver is mutually negotiated by the parties to this agreement.

§ 17.1.15 Other Insurance Provided by the Contractor

(List below any other insurance coverage to be provided by the Contractor and any applicable limits.)

Coverage	Limits

§ 17.2 Owner's Insurance

§ 17.2.1 Owner's Liability Insurance

The Owner shall be responsible for purchasing and maintaining the Owner's usual liability insurance.

§ 17.2.2 Property Insurance

§ 17.2.2.1 The Owner shall purchase and maintain, from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located, property insurance written on a builder's risk "all-risks" completed value or equivalent policy form and sufficient to cover the total value of the entire Project on a replacement cost basis. The Owner's property insurance coverage shall be no less than the amount of the initial Contract Sum, plus the value of subsequent Modifications and labor performed or materials or equipment supplied by others. The property insurance shall be maintained until Substantial Completion and thereafter as provided in Section 17.2.2.2, unless otherwise provided in the Contract Documents or otherwise agreed in writing by the parties to this Agreement. This insurance shall include the interests of the Owner, Contractor, Subcontractors, and Sub-subcontractors in the Project as insureds. This insurance shall include the interests of mortgagees as loss payees.

§ 17.2.2.2 Unless the parties agree otherwise, upon Substantial Completion, the Owner shall continue the insurance required by Section 17.2.2.1 or, if necessary, replace the insurance policy required under Section 17.2.2.1 with property insurance written for the total value of the Project that shall remain in effect until expiration of the period for correction of the Work set forth in Section 18.4.

§ 17.2.2.3 If the insurance required by this Section 17.2.2 is subject to deductibles or self-insured retentions, the Owner shall be responsible for all loss not covered because of such deductibles or retentions.

§ 17.2.2.4 If the Work involves remodeling an existing structure or constructing an addition to an existing structure, the Owner shall purchase and maintain, until the expiration of the period for correction of Work as set forth in Section 18.4, "all-risks" property insurance, on a replacement cost basis, protecting the existing structure against direct physical loss or damage, notwithstanding the undertaking of the Work. The Owner shall be responsible for all co-insurance penalties.

§ 17.2.2.5 Prior to commencement of the Work, the Owner shall secure the insurance, and provide evidence of the coverage, required under this Section 17.2.2 and, upon the Contractor's request, provide a copy of the property insurance policy or policies required by this Section 17.2.2. The copy of the policy or policies provided shall contain all applicable conditions, definitions, exclusions, and endorsements.

§ 17.2.2.6 Within three (3) business days of the date the Owner becomes aware of an impending or actual cancellation or expiration of any insurance required by this Section 17.2.2, the Owner shall provide notice to the Contractor of such impending or actual cancellation or expiration. Unless the lapse in coverage arises from an act or omission of the Contractor: (1) the Contractor, upon receipt of notice from the Owner, shall have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by either the Owner or the Contractor; (2) the Contract Time and Contract Sum shall be equitably adjusted; and (3) the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent any loss to the Owner would have been covered by the insurance had it not expired or been cancelled. If the Contractor purchases replacement coverage, the cost of the insurance shall be charged to the Owner by an appropriate Change Order. The furnishing of notice by the Owner shall not relieve the Owner of any contractual obligation to provide required insurance.

§ 17.2.2.7 Waiver of Subrogation

§ 17.2.2.7.1 The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents, and employees, each of the other; (2) the Architect and Architect's consultants; and (3) Separate Contractors, if any, and any of their subcontractors, sub-subcontractors, agents, and employees, for damages caused by fire, or other causes of loss, to the extent those losses are covered by property insurance required by this Agreement or other property insurance applicable to the Project, except such rights as they have to proceeds of such insurance. The Owner or Contractor, as appropriate, shall require similar written waivers in favor of the individuals and entities identified above from the Architect, Architect's consultants, Separate Contractors, subcontractors, and sub-subcontractors. The policies of insurance purchased and maintained by each person or entity agreeing to waive claims pursuant to this Section 17.2.2.7 shall not prohibit this waiver of subrogation. This waiver of subrogation shall be effective as to a person or entity (1) even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, (2) even though that person or entity did not pay the insurance premium directly or indirectly, or (3) whether or not the person or entity had an insurable interest in the damaged property.

§ 17.2.2.7.2 If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, to the extent permissible by such policies, the Owner waives all rights in accordance with the terms of Section 17.2.2.7.1 for damages caused by fire or other causes of loss covered by this separate property insurance.

§ 17.2.2.8 A loss insured under the Owner's property insurance shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause. The Owner shall pay the Architect and Contractor their just shares of insurance

proceeds received by the Owner, and by appropriate agreements, written where legally required for validity, the Architect and Contractor shall make payments to their consultants and Subcontractors in similar manner.

§ 17.2.3 Other Insurance Provided by the Owner

(List below any other insurance coverage to be provided by the Owner and any applicable limits.)

Coverage	Limits
N/A	

§ 17.3 Performance Bond and Payment Bond

§ 17.3.1 The Owner shall have the right to require the Contractor to furnish bonds covering faithful performance of the Contract and payment of obligations arising thereunder as stipulated in the Contract Documents on the date of execution of the Contract.

§ 17.3.2 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.

ARTICLE 18 CORRECTION OF WORK

§ 18.1 The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, whether discovered before or after Substantial Completion and whether or not fabricated, installed, or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Architect's services and expenses made necessary thereby, shall be at the Contractor's expense, unless compensable under Section A.1.7.3 in Exhibit A, Determination of the Cost of the Work.

§ 18.2 In addition to the Contractor's obligations under Section 9.4, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 15.6.3, or by terms of an 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, the Contractor shall correct it promptly after receipt of notice from the Owner to do so unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty.

§ 18.3 If the Contractor fails to correct nonconforming Work within a reasonable time, the Owner may correct it in accordance with Section 8.3.

§ 18.4 The one-year period for correction of Work 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 completion of that portion of the Work.

§ 18.5 The one-year period for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Article 18.

ARTICLE 19 MISCELLANEOUS PROVISIONS

§ 19.1 Assignment of Contract

§ 19.1.1 Neither party to the Contract shall assign the Contract without written consent of the other, except that the Owner may, without consent of the Contractor, assign the Contract to a lender providing construction financing for the Project if the lender assumes the Owner's rights and obligations under the Contract Documents. The Contractor shall execute all consents reasonably required to facilitate such assignment.

§ 19.1.2 The performance of all activities contemplated by this Agreement shall be accomplished by the Contractor. No portion of this Agreement may be assigned, subcontracted, transferred, conveyed, pledged or otherwise disposed of to any other individual, firm, or entity without the express and prior written approval of the Owner.

§ 19.1.3 Contractor shall verify responsibility criteria for each first tier subcontractor, and a subcontractor of any tier that hires other subcontractors must verify responsibility criteria for each of its subcontractors. Verification shall include that each subcontractor, at the time of subcontract execution, meets the responsibility criteria listed in RCW 39.04.350(1) and possesses an electrical contractor license, if required by chapter 19.28 RCW, an elevator contractor license, if required by chapter 70.87 RCW, or a plumbing contractor license, if required by chapter 18.106 RCW. This verification requirement, as well as the responsibility criteria, must be included in every public works contract and subcontract of every tier.

§ 19.2 Governing Law

The Contract shall be governed by the law of the place where the Project is located, excluding that jurisdiction's choice of law rules. If the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 21.6.

§ 19.3 Tests and Inspections

Tests, inspections, and approvals of portions of the Work required by the Contract Documents or by applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities shall be made at an appropriate time. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections, and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections, and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of tests, inspections, or approvals that do not become requirements until after bids are received or negotiations concluded. The Owner shall directly arrange and pay for tests, inspections, or approvals where building codes or applicable laws or regulations so require.

§ 19.4 The Owner's representative:

(Name, address, email address and other information)

Jason Link
Finance Director
Spokane County Library District
4322 N Argonne Road
Spokane WA 99212
FN_purchasing@sclld.org

§ 19.5 The Contractor's representative:

(Name, address, email address and other information)

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§ 19.6 The Architect's representative:

(Name, address, email address and other information)

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§ 19.7 Neither the Owner's, Architect's nor the Contractor's representative shall be changed without ten days' prior notice to the other party.

§ 19.8 Independent Contractor

§ 19.8.1 The Contractor's services shall be furnished by the Contractor as an independent contractor, and nothing herein contained shall be construed to create a relationship of employer-employee or master-servant, but all payments made hereunder and all services performed shall be made and performed pursuant to this Agreement by the Contractor as an independent contractor.

§ 19.8.2 The Contractor acknowledges that the entire compensation for this Agreement is the Contract Sum and the Contractor is not entitled to any benefits including, but not limited to: vacation pay, holiday pay, sick leave pay, medical, dental, or other insurance benefits, or any other rights or privileges afforded to employees of the Owner. Contractor agrees that Contractor is solely responsible for the payment of taxes applicable to the services performed under this Agreement and agrees to comply with all federal, state, and local laws regarding the reporting of taxes, maintenance of insurance and records, and all other requirements and obligations imposed on Contractor as a result of Contractor's status as an independent contractor. The Contractor is responsible for providing the office space and clerical support necessary for the performance of services under this Agreement. The Owner shall not be responsible for withholding or otherwise deducting federal income tax or social security or for contributing to the state industrial insurance or unemployment compensation programs or otherwise assuming the duties of an employer with respect to the Contractor, or any employee of Contractor.

Contractor will defend, indemnify, and hold harmless the Owner, its officers, agents, or employees from any loss or expense, including, but not limited to, settlements, judgments, setoffs, attorneys' fees, or costs incurred by reason of claims or demands because of breach of the provisions of this paragraph.

§ 19.9 No Guarantee of Employment

§ 19.9.1 The performance of all or part of this Agreement by the Contractor shall not operate to vest any employment rights whatsoever and shall not be deemed to guarantee any employment of the Contractor or any employee of the Contractor or any subcontractor or any employee of any subcontractor by the Owner at the present time or in the future.

§ 19.10 Conformity of Contractor Eligibility

§ 19.10.1 Contractor represents that within the three-year period immediately preceding the date of the bid solicitation for this Project, Contractor has not been determined by a final and binding citation and notice of assessment issued by the State of Washington Department of Labor and Industries or through a civil judgment entered by a court of limited or general jurisdiction to have willfully violated, as defined in RCW 49.48.082, any provision of chapters 49.46, 49.48, or 49.52 RCW.

§ 19.11 Public Records Act

§ 19.11.1 The Contract Documents and all records associated with the Contractor Documents shall be available for inspection and copying by the public where required by the Public Records Act, Chapter 42.56 RCW (the "Act"). To the extent that public records then in the custody of the Contractor are needed for the Owner to respond to a request under the Act, as determined by the Owner, the Contractor agrees to make them promptly available to the Owner at no cost to the Owner. If the Contractor considers any portion of any record provided to the Owner under this Agreement, whether in electronic or hard copy form, to be protected from disclosure under law, the Contractor shall clearly identify any specific information that is claimed to be confidential or proprietary. If the Owner receives request under the Act to inspect or copy the information so identified by the Contractor and the Owner determines that release of the information is required by the Act or otherwise appropriate, the Owner's sole obligations shall be to notify the Contractor (a) of the request and (b) of the date that such information will be released to the requester unless the Contractor obtains a court order to enjoin that disclosure pursuant to RCW 42.56.540. If the Contractor failed to timely obtain a court order enjoining disclosure, the Owner will release the requested information on the date specified.

§ 19.11.2 The Owner has and by this section assumes, no obligation on behalf of the Contractor to claim any exception from disclosure under the Act. The Owner shall not be liable to the Contractor for releasing records not clearly identified by the Contractor as confidential or proprietary. The Owner shall not be liable to the Contractor for

any records that the Owner releases in compliance with this section or in compliance with an order of a court of competent jurisdiction.

§ 19.11.3 The Contractor shall be liable to the requester for any and all fees, costs, penalties, or damages imposed or alleged as a result of the Contractor's failure to provide adequate or timely records.

§ 19.11.4 This provision and the obligations it establishes shall remain in effect after the expiration of this Agreement.

§ 19.12 Confidentiality

§ 19.12.1 The Contractor, its employees, subcontractors, and their employees shall maintain the confidentiality of all information provided by the Owner or acquired by the Contractor in performance of this Agreement, except upon the prior written consent of the Owner or an order entered by a court after having acquired jurisdiction over the Owner. Contractor shall immediately give to the Owner notice of any judicial proceeding seeking disclosure of such information. Contractor shall indemnify and hold harmless the Owner, its officials, agents, or employees from all loss or expense, including, but not limited to, settlements, judgments, setoffs, attorneys' fees, and costs resulting from Contractor's breach of this provision.

§ 19.13 Right to Review

§ 19.13.1 This Agreement is subject to review by any Federal, State, or County auditor. The Owner or its designee shall have the right to review and monitor the financial and service components related to this Agreement by whatever means are deemed expedient by the Owner Representative. Such review may occur with or without notice and may include, but is not limited to, on-site inspection by Owner agents or employees, inspection of all records or other materials which the Owner deems pertinent to the Agreement and its performance, and any and all communications with or evaluations by service recipients under this Agreement. The Contractor shall preserve and maintain all financial records and records relating to the performance of work under this Agreement for three (3) years after termination of the Agreement, and shall make them available for such review, within Spokane County, State of Washington, upon request. Contractor also agrees to notify the Owner Representative in advance of any inspections, audits, or program review by any individual, agency, or governmental unit whose purpose is to review the services provided within the terms of this Agreement. If no advance notice is given to the Contractor, then the Contractor agrees to notify the Owner Representative as soon as it is practical.

§ 19.14 Non-Discrimination in Employment

§ 19.14.1 The Owner's policy is to provide equal opportunity in all terms, conditions, and privileges of employment for all qualified applicants and employees without regard to race, color, creed, religion, national origin, sex, sexual orientation age, marital status, disability, or veteran status. The Contractor shall comply with all laws prohibiting discrimination against any employee or applicant for employment on the grounds of race, color, creed, religion, national origin, sex, sexual orientation, age, marital status, disability, or veteran status, except where such constitutes a bona fide occupational qualification.

§ 19.14.2 Contractor shall, in employment made possible or resulting from this Agreement, ensure that there shall be no unlawful discrimination against any employee or applicant for employment in violation of RCW 49.60.180, as currently written or hereafter amended, or other applicable law prohibiting discrimination, unless based upon a bona fide occupational qualification as provided in RCW 49.60.180 or as otherwise permitted by other applicable law. Further, no person shall be denied or subjected to discrimination in receipt of the benefit of any services or activities made possible by or resulting from this Agreement in violation of RCW 49.60.215 or other applicable law prohibiting discrimination.

§ 19.14.3 Furthermore, in those cases in which the Contractor is governed by such laws, the Contractor shall take affirmative action to ensure that applicants are employed, and treated during employment, without regard to their race, color, creed, religion, national origin, sex, age, marital status, sexual orientation, disability, or veteran status, except where such constitutes a bona fide occupational qualification. Such action shall include, but not be limited to: advertising, hiring, promotions, layoffs or terminations, rate of pay or other forms of compensation benefits, selection for training including apprenticeship, and participation in recreational and educational activities. In all solicitations or advertisements for employees placed by them or on their behalf, the Contractor shall state that all qualified applicants will receive consideration for employment without regard to race, color religion, sex, sexual orientation, or national origin.

§ 19.14.4 The foregoing provisions shall also be binding upon any subcontractor, provided that the foregoing provision shall not apply to contracts or subcontractors for standard commercial supplies or raw materials, or to sole proprietorships with no employees.

§ 19.15 Non-Discrimination in Client Services

§ 19.15.1 The Contractor shall not discriminate on the grounds of race, color, creed, religion, national origin, sex, age, marital status, sexual orientation, disability, or veteran status; or deny an individual or business any service or benefits under this Agreement; or subject an individual or business to segregation or separate treatment in any manner related to his/her/its receipt any service or services or other benefits provided under this Agreement; or deny an individual or business an opportunity to participate in any program provided by this Agreement

§ 19.16 Waiver of Noncompetition

§ 19.16.1 Contractor irrevocably waives any existing rights which it may have, by contract or otherwise, to require another person or corporation to refrain from submitting a proposal to or performing work or providing supplies to the Owner, and contractor further promises that it will not in the future, directly or indirectly, induce or solicit any person or corporation to refrain from submitting a bid or proposal to or from performing work or providing supplies to the Owner.

§ 19.17 Conflict of Interest

§ 19.17.1 If at any time prior to commencement of, or during the term of this Agreement, Contractor or any of its employees involved in the performance of this Agreement shall have or develop an interest in the subject matter of this Agreement that is potentially in conflict with the Owner's interest, then Contractor shall immediately notify the Owner of the same. The notification of the Owner shall be made with sufficient specificity to enable the Owner to make an informed judgment as to whether or not the Owner's interest may be compromised in any manner by the existence of the conflict, actual or potential. Thereafter, the Owner may require the Contractor to take reasonable steps to remove the conflict of interest. The Owner may also terminate this Agreement according to the provisions herein for termination.

§ 19.18 Media Release

§ 19.18.1 Mention of the Owner in advertising, customer lists, photographs, or articles in the professional literature pertaining to an award resulting from bids made in response to this invitation is prohibited without prior written approval from the Owner.

§ 19.19 Certification of Public Works Contractor's Status Under State Law

§ 19.19.1 If applicable, Contractor certifies that it has fully met the responsibility criteria required of public works contractors under RCW 39.04.350 (1), which include: (a) having a certificate of registration in compliance with RCW 18.27; (b) having a current state unified business identifier number; (c) if applicable, having industrial insurance coverage for its employees working in Washington as required in Title 51 RCW, an employment security department number as required in Title 50 RCW, and a state excise tax registration number as required in Title 82 RCW; and (d) not being disqualified from bidding on any public works contract under RCW 39.06.010 or 39.12.065 (3).

§ 19.20 Certification Regarding the state of Washington and Federal Debarment, Suspension, Ineligibility and Voluntary Exclusion – Lower Tier Covered Transactions

§ 19.20.1 If applicable, the Contractor further certifies, by executing this Agreement, that neither it nor its principles is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by the state of Washington, any Federal department or Agency.

§ 19.20.2 The Contractor also agrees that it shall not knowingly enter into any lower tier covered transactions (a transaction between the Contractor and any other person) with a person who is proposed for debarment, debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, and the Contractor agrees to include this clause titled "Certification Regarding state of Washington and Federal Debarment, Suspension, Ineligibility and Voluntary Exclusion - Lower Tier Covered Transaction" without modification, in all lower tier covered transactions and in all solicitations for lower tier transactions.

§ 19.20.3 The "Debarred Contractor List" for the Vendors Not Allowed to bid on public works projects in the state of Washington is available to research this information at <https://des.wa.gov/policies-legal/vendors-not-allowed-bid-debarment>. Contractor shall immediately notify the Owner if, during the term of this Contract, Contractor becomes debarred.

§ 19.20.4 The "Excluded Parties List System" in the System for Award Management (SAM) website is available to research this information at <https://www.sam.gov>. Contractor shall immediately notify the Owner if, during the term of this Contract, Contractor becomes debarred.

§ 19.21 Non-Collusion

§ 19.21.1 The Contractor acknowledges that the person, firm, association, co- partnership, or corporation herein named, has not either directly or indirectly entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of free competitive bidding in the preparation or submission of a proposal to the Owner for consideration in the award of a contract on the specifications contained in this Agreement.

§ 19.22 Contractor Commitments, Warranties, and Representations

§ 19.22.1 Any written commitment received from the Contractor concerning this Agreement shall be binding upon the Contractor, unless otherwise specifically provided herein with reference to this paragraph. Failure of the Contractor to fulfill such a commitment shall render the Contractor liable for damages to the Owner. A commitment includes, but is not limited to, any representation made prior to execution of this Agreement, whether or not incorporated elsewhere herein by reference, as to performance of services or equipment, prices or options for future acquisition to remain in effect for a fixed period, or warranties.

§ 19.23 Survival

§ 19.23.1 The provisions of Articles 5, 17, 18, 20 and 21, and Sections 7.5, 9.4, 9.5, 9.14, 9.15, 15.8, 19.8, 19.9, 19.11, 19.12, 19.13, 19.16, 19.18, 19.22, if utilized, shall survive, notwithstanding the termination or invalidity of this Agreement for any reason.

ARTICLE 20 TERMINATION OF THE CONTRACT

§ 20.1 Termination by the Contractor

If the Architect fails to certify payment as provided in Section 15.4.1 for a period of 30 days through no fault of the Contractor, or if the Owner fails to make payment as provided in Section 4.1.3 for a period of 30 days, the Contractor may, upon seven additional days' notice to the Owner and the Architect, terminate the Contract and recover from the Owner payment for Work executed, including reasonable overhead and profit, costs incurred by reason of such termination, and damages.

§ 20.2 Termination by the Owner for Cause

§ 20.2.1 The Owner may terminate the Contract if the Contractor

- .1 repeatedly refuses or fails to supply enough properly skilled workers or proper materials;
- .2 fails to make payment to Subcontractors for materials or labor in accordance with the respective agreements between the Contractor and the Subcontractors;
- .3 repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or
- .4 otherwise is guilty of substantial breach of a provision of the Contract Documents.

§ 20.2.2 When any of the reasons described in Section 20.2.1 exists, the Owner, upon certification by the Architect that sufficient cause exists to justify such action, may, without prejudice to any other remedy the Owner may have and after giving the Contractor seven days' notice, terminate the Contract and take possession of the site and of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor and may finish the Work by whatever reasonable method the Owner may deem expedient. Upon request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

§ 20.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 20.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.

§ 20.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall be certified by the Architect, upon application, and this obligation for payment shall survive termination of the Contract.

§ 20.3 Termination by the Owner for Convenience

The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause. The Owner shall pay the Contractor for Work executed; and costs incurred by reason of such termination, including costs attributable to termination of Subcontracts. There shall be no termination fee.

N/A

ARTICLE 21 CLAIMS AND DISPUTES

§ 21.1.1 Differences between the Contractor and the Owner, arising under and by virtue of the Contract Documents, shall be brought to the attention of the Owner at the earliest possible time in order that such matters may be settled or other appropriate action promptly taken. Except for such objections as are made of record in the manner hereinafter specified and within the time limits stated, the records, orders, rulings, instructions, and decisions of the Owner's Representative shall be final and conclusive.

§ 21.1.2 Claims, disputes, and other matters in question arising out of or relating to this Contract, including those alleging an error or omission by the Architect but excluding those arising under Section 16.2, shall be referred initially to the Architect for decision. Such matters, except those waived as provided for in Section 21.11 and Sections 15.7.3 and 15.7.4, shall, after initial decision by the Architect or 30 days after submission of the matter to the Architect, be subject to mediation as a condition precedent to binding dispute resolution.

§ 21.2 Notice of Claims

§ 21.2.1 The Contractor shall not be entitled to additional compensation which otherwise may be payable, or to extension of time for (1) any act or failure to act by the Owner's Representative or the Owner, or (2) the happening of any event or occurrence, unless the Contractor has given the Owner a written Notice of Potential Claim within ten (10) days of the commencement of the act, failure, or event giving rise to the claim, and before final payment by the Owner. The written Notice of Potential Claim shall set forth the reasons for which the Contractor believes additional compensation or extension of time is due, the nature of the cost involved, and insofar as possible, the amount of the potential claim. Contractor shall keep full and complete daily records of the work performed, labor and material used, and all costs and additional time claimed to be additional.

§ 21.2.2 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered prior to expiration of the period for correction of the Work set forth in Section 18.2, shall be initiated by notice to the Architect within 14 days after occurrence of the event giving rise to such Claim or within 14 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

§ 21.2.3 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 18.2, shall be initiated by notice to the other party.

§ 21.2.4 Claim must cover all costs and be documented: A Claim shall be deemed to cover all changes in cost and time (including direct, indirect, impact, and consequential) to which Contractor (and Subcontractors) may be entitled and may not contain reservations of rights without Owner's written approval; any such unapproved reservations of rights shall be without effect. At a minimum, a Claim shall contain the following information:

- i. Factual statement of Claim: A detailed factual statement of the Claim for additional compensation and/or time, if any, providing all necessary dates, locations, and items of work affected by the Claim and confirming the damages asserted (time and cost) are actually caused by and/or a result of the act, event, or condition complained of;
- ii. Dates: The date on which event(s) arose which gave rise to the Claim;

- iii. Individuals knowledgeable about Claim: The name of each individual, including but not limited to employees of Contractor, Subcontractors, Owner and/or Architect/Engineer believed to be knowledgeable about the Claim;
- iv. Support from Agreement Documents: The specific provisions of the Agreement that support the Claim;
- v. Identification of other supporting information: The identification of any documents and the substance of any oral communications that support the Claim;
- vi. Copies of supporting documentation: Data and copies of any identified documents, other than the Agreement, that support the Claim;
- vii. Details on Claim for Contract Time: If an adjustment in the time to perform is sought, the specific days and dates for which it is sought; the specific reasons Contractor believes an extension in the time should be granted, and Contractor's analysis of its schedule to demonstrate the reason for the time extension.
- viii. Details on Claim for adjustment of Total Compensation: If an adjustment in the Total Compensation is sought, the exact amount sought and a breakdown of that amount into the categories and with the detail required by this Agreement; and
- ix. Statement certifying Claim: 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 Total Compensation or time to perform for which Contractor believes Owner is liable.

§ 21.3 Time Limits on Claims

The Owner and Contractor shall commence all claims and causes of action against the other and arising out of or related to the Contract in accordance with the requirements of the final dispute resolution method selected in this Agreement whether in contract, tort, breach of warranty, or otherwise, within the period specified by applicable law, but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all claims and causes of action not commenced in accordance with this Section 21.3.

§ 21.4 If a claim, dispute or other matter in question relates to or is the subject of a mechanic's lien, the party asserting such matter may proceed in accordance with applicable law to comply with the lien notice or filing deadlines.

§ 21.5 The parties shall endeavor to resolve their disputes by mediation which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association, in Spokane County, Washington, in accordance with their Construction Industry Mediation Procedures in effect on the date of this Agreement. A request for mediation shall be made in writing, delivered to the other party to this Agreement, and filed with the person or entity administering the mediation. The request may be made concurrently with the binding dispute resolution but, in such event, mediation shall proceed in advance of binding dispute resolution proceedings, which shall be stayed pending mediation for a period of 60 days from the date of filing, unless stayed for a longer period by agreement of the parties or court order. If an arbitration is stayed pursuant to this Section, the parties may nonetheless proceed to the selection of the arbitrator(s) and agree upon a schedule for later proceedings.

§ 21.6 If the parties have selected arbitration as the method for binding dispute resolution in this Agreement, any claim, subject to, but not resolved by, mediation shall be subject to arbitration which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association, in accordance with the Construction Industry Arbitration Rules in effect on the date of this Agreement. Demand for arbitration shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the arbitration. The parties agree that the decision of the arbitrator shall be the sole and exclusive remedy between them regarding any dispute presented or pled before the arbitrator. The award rendered by the arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof. There shall be one arbitrator selected by the parties within ten (10) days of the arbitration demand, or if not, by the American Arbitration Association or any other group having similar credentials. Each party shall pay its own costs of arbitration including attorneys' fees. The arbitrator's fee and any administrative expenses imposed by the arbitrator shall be shared equally by the parties.

§ 21.7 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party, at its sole discretion, may consolidate an arbitration conducted under this Agreement with any other arbitration to which it is a party provided that (1) the arbitration agreement governing the other arbitration permits consolidation;

(2) the arbitrations to be consolidated substantially involve common questions of law or fact; and (3) the arbitrations employ materially similar procedural rules and methods for selecting arbitrator(s).

§ 21.8 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, any party to an arbitration may include by joinder persons or entities substantially involved in a common question of law or fact whose presence is required if complete relief is to be accorded in arbitration provided that the party sought to be joined consents in writing to such joinder. Consent to arbitration involving an additional person or entity shall not constitute consent to arbitration of a Claim not described in the written Consent.

§ 21.9 The foregoing agreement to arbitrate and other agreements to arbitrate with an additional person or entity duly consented to by parties to this Agreement, shall be specifically enforceable under applicable law in any court having jurisdiction thereof.

§ 21.10 Continuing Contract Performance

Pending final resolution of a Claim, except as otherwise agreed in writing, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents.

§ 21.11 Waiver of Claims for Consequential Damages

§ 21.11.1 Except as otherwise expressly set forth herein, the Contractor and Owner waive claims against each other for consequential damages arising out of or relating to this Contract. This mutual waiver includes

- .1 damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and
- .2 damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit except anticipated profit arising directly from the Work.

This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 20. Nothing contained in this Section 21.11 shall be deemed to preclude an award of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

§ 21.11.2 Waiver of any breach or condition of this Agreement shall not be deemed a waiver of any prior or subsequent breach. No term or condition of this Agreement shall be held to be waived, modified, or deleted except by an instrument, in writing, signed by the parties hereto. The failure of the Owner to insist upon strict performance of any of the covenants and agreements of this Agreement, or to exercise any option herein conferred in any one or more instances, shall not be construed to be a waiver or relinquishment of any such, or any other covenants or agreements, but the same shall be and remain in full force and effect.

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

OWNER *(Signature)*

« »« »

(Printed name and title)

CONTRACTOR *(Signature)*

« »« »

(Printed name and title)

DRAFT AIA® Document A201® – 2017

General Conditions of the Contract for Construction

for the following PROJECT:

(Name and location or address)

«»ARGONNE HVAC SYSTEMS REPLACEMENT
4322 N Argonne Road
Spokane, WA 99212«»

THE OWNER:

(Name, legal status and address)

«»Spokane County Library District«»
«»4322 N Argonne Road
«»Spokane, WA 99212

THE ARCHITECT:

(Name, legal status and address)

«Integrus Architecture »« »
«10 S Cedar St »
«Spokane, WA 99201 «»«»
«»

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ADDITIONS AND DELETIONS:

The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed.

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ARTICLE 1 GENERAL PROVISIONS

§ 1.1 Basic Definitions

§ 1.1.1 The Contract Documents

The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of the Contract, other documents listed in the Agreement, and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive, or (4) a written order for a minor change in the Work issued by the Architect. Unless specifically enumerated in the Agreement, the Contract Documents do not include the advertisement or invitation to bid, Instructions to Bidders, sample forms, other information furnished by the Owner in anticipation of receiving bids or proposals, the Contractor's bid or proposal, or portions of Addenda relating to bidding or proposal requirements.

§ 1.1.2 The Contract

The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Architect or the Architect's consultants, (2) between the Owner and a Subcontractor or a Sub-subcontractor, (3) between the Owner and the Architect or the Architect's consultants, or (4) between any persons or entities other than the Owner and the Contractor. The Architect shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of the Architect's duties.

§ 1.1.3 The Work

The term "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment, and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project.

§ 1.1.4 The Project

The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by the Owner and by Separate Contractors.

§ 1.1.5 The Drawings

The Drawings are the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules, and diagrams.

§ 1.1.6 The Specifications

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

§ 1.1.7 Instruments of Service

Instruments of Service are representations, in any medium of expression now known or later developed, of the tangible and intangible creative work performed by the Architect and the Architect's consultants under their respective professional services agreements. Instruments of Service may include, without limitation, studies, surveys, models, sketches, drawings, specifications, and other similar materials.

§ 1.1.8 Initial Decision Maker

The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2. The Initial Decision Maker shall not show partiality to the Owner or Contractor and shall not be liable for results of interpretations or decisions rendered in good faith.

§ 1.2 Correlation and Intent of the Contract Documents

§ 1.2.1 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

§ 1.2.1.1 The invalidity of any provision of the Contract Documents shall not invalidate the Contract or its remaining provisions. If it is determined that any provision of the Contract Documents violates any law, or is otherwise invalid or unenforceable, then that provision shall be revised to the extent necessary to make that provision legal and enforceable. In such case the Contract Documents shall be construed, to the fullest extent permitted by law, to give effect to the parties' intentions and purposes in executing the Contract.

§ 1.2.2 Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.

§ 1.2.3 Unless otherwise stated in the Contract Documents, words that have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

§ 1.3 Capitalization

Terms capitalized in these General Conditions include those that are (1) specifically defined, (2) the titles of numbered articles, or (3) the titles of other documents published by the American Institute of Architects.

§ 1.4 Interpretation

In the interest of brevity the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an," but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

§ 1.5 Ownership and Use of Drawings, Specifications, and Other Instruments of Service

§ 1.5.1 The Architect and the Architect's consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and retain all common law, statutory, and other reserved rights in their Instruments of Service, including copyrights. The Contractor, Subcontractors, Sub-subcontractors, and suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with the Project is not to be construed as publication in derogation of the Architect's or Architect's consultants' reserved rights.

§ 1.5.2 The Contractor, Subcontractors, Sub-subcontractors, and suppliers are authorized to use and reproduce the Instruments of Service provided to them, subject to any protocols established pursuant to Sections 1.7 and 1.8, solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and suppliers may not use the Instruments of Service on other projects or for additions to the Project outside the scope of the Work without the specific written consent of the Owner, Architect, and the Architect's consultants.

§ 1.6 Notice

§ 1.6.1 Except as otherwise provided in Section 1.6.2, where the Contract Documents require one party to notify or give notice to the other party, such notice shall be provided in writing to the designated representative of the party to whom the notice is addressed and shall be deemed to have been duly served if delivered in person, by mail, by courier, or by electronic transmission if a method for electronic transmission is set forth in the Agreement.

§ 1.6.2 Notice of Claims as provided in Section 15.1.3 shall be provided in writing and shall be deemed to have been duly served only if delivered to the designated representative of the party to whom the notice is addressed by certified or registered mail, or by courier providing proof of delivery.

§ 1.7 Digital Data Use and Transmission

The parties shall agree upon written protocols governing the transmission and use of, and reliance on, Instruments of Service or any other information or documentation in digital form.

§ 1.8 Building Information Models Use and Reliance

Any use of, or reliance on, all or a portion of a building information model without agreement to written protocols governing the use of, and reliance on, the information contained in the model shall be at the using or relying party's sole risk and without liability to the other party and its contractors or consultants, the authors of, or contributors to, the building information model, and each of their agents and employees.

ARTICLE 2 OWNER

§ 2.1 General

§ 2.1.1 The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner's approval or authorization. Except as otherwise provided in Section 4.2.1, the Architect does not have such authority. The term "Owner" means the Owner or the Owner's authorized representative.

§ 2.1.2 The Owner shall furnish to the Contractor, within fifteen days after receipt of a written request, information necessary and relevant for the Contractor to evaluate, give notice of, or enforce mechanic's lien rights. Such information shall include a correct statement of the record legal title to the property on which the Project is located, usually referred to as the site, and the Owner's interest therein.

§ 2.2 Evidence of the Owner's Financial Arrangements

§ 2.2.1 Prior to commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. The Contractor shall have no obligation to commence the Work until the Owner provides such evidence. If commencement of the Work is delayed under this Section 2.2.1, the Contract Time shall be extended appropriately.

§ 2.2.2 Following commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract only if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) the Contractor identifies in writing a reasonable concern regarding the Owner's ability to make payment when due; or (3) a change in the Work materially changes the Contract Sum. If the Owner fails to provide such evidence, as required, within fourteen days of the Contractor's request, the Contractor may immediately stop the Work and, in that event, shall notify the Owner that the Work has stopped. However, if the request is made because a change in the Work materially changes the Contract Sum under (3) above, the Contractor may immediately stop only that portion of the Work affected by the change until reasonable evidence is provided. If the Work is stopped under this Section 2.2.2, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided in the Contract Documents.

§ 2.2.3 After the Owner furnishes evidence of financial arrangements under this Section 2.2, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.

§ 2.2.4 Where the Owner has designated information furnished under this Section 2.2 as "confidential," the Contractor shall keep the information confidential and shall not disclose it to any other person. However, the Contractor may disclose "confidential" information, after seven (7) days' notice to the Owner, where disclosure is required by law, including a subpoena or other form of compulsory legal process issued by a court or governmental entity, or by court or arbitrator(s) order. The Contractor may also disclose "confidential" information to its employees, consultants, sureties, Subcontractors and their employees, Sub-subcontractors, and others who need to know the content of such information solely and exclusively for the Project and who agree to maintain the confidentiality of such information.

§ 2.3 Information and Services Required of the Owner

§ 2.3.1 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities.

§ 2.3.2 The Owner shall retain an architect lawfully licensed to practice architecture, or an entity lawfully practicing architecture, in the jurisdiction where the Project is located. That person or entity is identified as the Architect in the Agreement and is referred to throughout the Contract Documents as if singular in number.

§ 2.3.3 If the employment of the Architect terminates, the Owner shall employ a successor to whom the Contractor has no reasonable objection and whose status under the Contract Documents shall be that of the Architect.

§ 2.3.4 The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site. The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.

§ 2.3.5 The Owner shall furnish information or services required of the Owner by the Contract Documents with reasonable promptness. The Owner shall also furnish any other information or services under the Owner's control and relevant to the Contractor's performance of the Work with reasonable promptness after receiving the Contractor's written request for such information or services.

§ 2.3.6 Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor one copy of the Contract Documents for purposes of making reproductions pursuant to Section 1.5.2.

§ 2.4 Owner's Right to Stop the Work

If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2 or repeatedly fails to carry out Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6.1.3.

§ 2.5 Owner's Right to Carry Out the Work

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten-day period after receipt of notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such default or neglect. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect and the Architect may, pursuant to Section 9.5.1, withhold or nullify a Certificate for Payment in whole or in part, to the extent reasonably necessary to reimburse the Owner for the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect, or failure. If current and future payments are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner. If the Contractor disagrees with the actions of the Owner or the Architect, or the amounts claimed as costs to the Owner, the Contractor may file a Claim pursuant to Article 15.

ARTICLE 3 CONTRACTOR

§ 3.1 General

§ 3.1.1 The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.

§ 3.1.2 The Contractor shall perform the Work in accordance with the Contract Documents.

§ 3.1.3 The Contractor shall not be relieved of its obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Architect in the Architect's administration of the Contract, or by tests, inspections or approvals required or performed by persons or entities other than the Contractor.

§ 3.2 Review of Contract Documents and Field Conditions by Contractor

§ 3.2.1 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed, and correlated personal observations with requirements of the Contract Documents.

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.3.4, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

§ 3.2.3 The Contractor is not required to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, but the Contractor shall promptly report to the Architect any nonconformity discovered by or made known to the Contractor as a request for information in such form as the Architect may require.

§ 3.2.4 If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall submit Claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.3, the Contractor shall pay such costs and damages to the Owner, subject to Section 15.1.7, as would have been avoided if the Contractor had performed such obligations. If the Contractor performs those obligations, the Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities.

§ 3.3 Supervision and Construction Procedures

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The 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 under the Contract. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences, or procedures, the Contractor shall evaluate the jobsite safety thereof and shall be solely responsible for the jobsite safety of such means, methods, techniques, sequences, or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely notice to the Owner and Architect, and shall propose alternative means, methods, techniques, sequences, or procedures. The Architect shall evaluate the proposed alternative solely for conformance with the design intent for the completed construction. Unless the Architect objects to the Contractor's proposed alternative, the Contractor shall perform the Work using its alternative means, methods, techniques, sequences, or procedures.

§ 3.3.2 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for, or on behalf of, the Contractor or any of its Subcontractors.

§ 3.3.3 The Contractor shall be responsible for inspection of portions of Work already performed to determine that such portions are in proper condition to receive subsequent Work.

§ 3.4 Labor and Materials

§ 3.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

§ 3.4.2 Except in the case of minor changes in the Work approved by the Architect in accordance with Section 3.12.8 or ordered by the Architect in accordance with Section 7.4, the Contractor may make substitutions only with the consent of the Owner, after evaluation by the Architect and in accordance with a Change Order or Construction Change Directive.

§ 3.4.3 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of unfit persons or persons not properly skilled in tasks assigned to them.

~~**§ 3.4.4** The Contractor agrees to comply with state and federal requirements, including but not limited to those pertaining to payment of wages and working conditions, in accordance with RCW 39.12.040, the Prevailing Wage Act, the Americans with Disabilities Act of 1990, the Davis-Bacon Act, and the Contract Work Hours and Safety Standards Act providing for weekly payment of prevailing wages, minimum overtime pay, and providing that no laborer or mechanic shall be required to work in surroundings or under conditions which are unsanitary, hazardous, or dangerous to health and safety as determined by regulations promulgated by the Federal Secretary of Labor and the State of Washington.~~

§ 3.5 Warranty

§ 3.5.1 The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

§ 3.5.2 All material, equipment, or other special warranties required by the Contract Documents shall be issued in the name of the Owner, or shall be transferable to the Owner, and shall commence in accordance with Section 9.8.4.

§ 3.6 Taxes

The Contractor shall pay sales, consumer, use and similar taxes for the Work provided by the Contractor that are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect.

§ 3.7 Permits, Fees, Notices and Compliance with Laws

§ 3.7.1 Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit as well as for other permits, fees, licenses, and inspections by government agencies necessary for proper execution and completion of the Work that are customarily secured after execution of the Contract and legally required at the time bids are received or negotiations concluded.

§ 3.7.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work.

§ 3.7.3 If the Contractor performs Work knowing it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction.

§ 3.7.4 Concealed or Unknown Conditions

If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner and the Architect before conditions are disturbed and in no event later than 14 days after first observance of the conditions. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend that an equitable adjustment be made in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner and Contractor, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may submit a Claim as provided in Article 15.

§ 3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner and Architect. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15.

§ 3.8 Allowances

§ 3.8.1 The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct, but the Contractor shall not be required to employ persons or entities to whom the Contractor has reasonable objection.

§ 3.8.2 Unless otherwise provided in the Contract Documents,

- .1 allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;
- .2 Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit, and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances; and
- .3 whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2.

§ 3.8.3 Materials and equipment under an allowance shall be selected by the Owner with reasonable promptness.

§ 3.9 Superintendent

§ 3.9.1 The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor.

§ 3.9.2 The Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the name and qualifications of a proposed superintendent. Within 14 days of receipt of the information, the Architect may notify the Contractor, stating whether the Owner or the Architect (1) has reasonable objection to the proposed superintendent or (2) requires additional time for review. Failure of the Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection.

§ 3.9.3 The Contractor shall not employ a proposed superintendent to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not change the superintendent without the Owner's consent, which shall not unreasonably be withheld or delayed.

§ 3.10 Contractor's Construction and Submittal Schedules

§ 3.10.1 The Contractor, promptly after being awarded the Contract, shall submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall contain detail appropriate for the Project, including (1) the date of commencement of the Work, interim schedule milestone dates, and the date of Substantial Completion; (2) an apportionment of the Work by construction activity; and (3) the time required for completion of each portion of the Work. The schedule shall provide for the orderly progression of the Work to completion and shall not exceed time limits current under the Contract Documents. The schedule shall be revised at appropriate intervals as required by the conditions of the Work and Project.

§ 3.10.2 The Contractor, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, shall submit a submittal schedule for the Architect's approval. The Architect's approval shall not be unreasonably delayed or withheld. The submittal schedule shall (1) be coordinated with the Contractor's construction schedule, and (2) allow the Architect reasonable time to review submittals. If the Contractor fails to

submit a submittal schedule, or fails to provide submittals in accordance with the approved submittal schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

§ 3.10.3 The Contractor shall perform the Work in general accordance with the most recent schedules submitted to the Owner and Architect.

§ 3.11 Documents and Samples at the Site

The Contractor shall make available, at the Project site, the Contract Documents, including Change Orders, Construction Change Directives, and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and the approved Shop Drawings, Product Data, Samples, and similar required submittals. These shall be in electronic form or paper copy, available to the Architect and Owner, and delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

§ 3.12 Shop Drawings, Product Data and Samples

§ 3.12.1 Shop Drawings are drawings, diagrams, schedules, and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier, or distributor to illustrate some portion of the Work.

§ 3.12.2 Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams, and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.

§ 3.12.3 Samples are physical examples that illustrate materials, equipment, or workmanship, and establish standards by which the Work will be judged.

§ 3.12.4 Shop Drawings, Product Data, Samples, and similar submittals are not Contract Documents. Their purpose is to demonstrate how the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Architect is subject to the limitations of Section 4.2.7. Informational submittals upon which the Architect is not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Architect without action.

§ 3.12.5 The Contractor shall review for compliance with the Contract Documents, approve, and submit to the Architect, Shop Drawings, Product Data, Samples, and similar submittals required by the Contract Documents, in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner or of Separate Contractors.

§ 3.12.6 By submitting Shop Drawings, Product Data, Samples, and similar submittals, the Contractor represents to the Owner and Architect that the Contractor has (1) reviewed and approved them, (2) determined and verified materials, field measurements and field construction criteria related thereto, or will do so, and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

§ 3.12.7 The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples, or similar submittals, until the respective submittal has been approved by the Architect.

§ 3.12.8 The Work shall be in accordance with approved submittals except that the Contractor shall not be relieved of responsibility for deviations from the requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples, or similar submittals, unless the Contractor has specifically notified the Architect of such deviation at the time of submittal and (1) the Architect has given written approval to the specific deviation as a minor change in the Work, or (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples, or similar submittals, by the Architect's approval thereof.

§ 3.12.9 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples, or similar submittals, to revisions other than those requested by the Architect on previous submittals. In the absence of such notice, the Architect's approval of a resubmission shall not apply to such revisions.

§ 3.12.10 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences, and procedures. The Contractor shall not be required to provide professional services in violation of applicable law.

§ 3.12.10.1 If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The Contractor shall be entitled to rely upon the adequacy and accuracy of the performance and design criteria provided in the Contract Documents. The Contractor shall cause such services or certifications to be provided by an appropriately licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings, and other submittals prepared by such professional. Shop Drawings, and other submittals related to the Work, designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled to rely upon the adequacy and accuracy of the services, certifications, and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor the performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review and approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.

§ 3.12.10.2 If the Contract Documents require the Contractor's design professional to certify that the Work has been performed in accordance with the design criteria, the Contractor shall furnish such certifications to the Architect at the time and in the form specified by the Architect.

§ 3.13 Use of Site

The Contractor shall confine operations at the site to areas permitted by applicable laws, statutes, ordinances, codes, rules and regulations, lawful orders of public authorities, and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

§ 3.14 Cutting and Patching

§ 3.14.1 The Contractor shall be responsible for cutting, fitting, or patching required to complete the Work or to make its parts fit together properly. All areas requiring cutting, fitting, or patching shall be restored to the condition existing prior to the cutting, fitting, or patching, unless otherwise required by the Contract Documents.

§ 3.14.2 The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or Separate Contractors by cutting, patching, or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter construction by the Owner or a Separate Contractor except with written consent of the Owner and of the Separate Contractor. Consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold, from the Owner or a Separate Contractor, its consent to cutting or otherwise altering the Work.

§ 3.15 Cleaning Up

§ 3.15.1 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials and rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery, and surplus materials from and about the Project.

§ 3.15.2 If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and the Owner shall be entitled to reimbursement from the Contractor.

§ 3.16 Access to Work

The Contractor shall provide the Owner and Architect with access to the Work in preparation and progress wherever located.

§ 3.17 Royalties, Patents and Copyrights

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner and Architect harmless from loss on account thereof, but shall not be responsible for defense or loss when a particular design, process, or product of a particular manufacturer or manufacturers is required by the Contract Documents, or where the copyright violations are contained in Drawings, Specifications, or other documents prepared by the Owner or Architect. However, if an infringement of a copyright or patent is discovered by, or made known to, the Contractor, the Contractor shall be responsible for the loss unless the information is promptly furnished to the Architect.

§ 3.18 Indemnification

§ 3.18.1 To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the Owner, the Owner's Board of Trustees, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), but only to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss, or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity that would otherwise exist as to a party or person described in this Section 3.18.

§ 3.18.2 In claims against any person or entity indemnified under this Section 3.18 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, the indemnification obligation under Section 3.18.1 shall not be limited by a limitation on amount or type of damages, compensation, or benefits payable by or for the Contractor or a Subcontractor under workers' compensation acts, disability benefit acts, or other employee benefit acts.

ARTICLE 4 ARCHITECT

§ 4.1 General

§ 4.1.1 The Architect is the person or entity retained by the Owner pursuant to Section 2.3.2 and identified as such in the Agreement.

§ 4.1.2 Duties, responsibilities, and limitations of authority of the Architect as set forth in the Contract Documents shall not be restricted, modified, or extended without written consent of the Owner, Contractor, and Architect. Consent shall not be unreasonably withheld.

§ 4.2 Administration of the Contract

§ 4.2.1 The Architect will provide administration of the Contract as described in the Contract Documents and will be an Owner's representative during construction until the date the Architect issues the final Certificate for Payment. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents.

§ 4.2.2 The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the progress and quality of the portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Architect will not have control over, charge of, or responsibility for the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents.

§ 4.2.3 On the basis of the site visits, the Architect will keep the Owner reasonably informed about the progress and quality of the portion of the Work completed, and promptly report to the Owner (1) known deviations from the

Contract Documents, (2) known deviations from the most recent construction schedule submitted by the Contractor, and (3) defects and deficiencies observed in the Work. The Architect will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not have control over or charge of, and will not be responsible for acts or omissions of, the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

§ 4.2.4 Communications

The Owner and Contractor shall include the Architect in all communications that relate to or affect the Architect's services or professional responsibilities. The Owner shall promptly notify the Architect of the substance of any direct communications between the Owner and the Contractor otherwise relating to the Project. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and suppliers shall be through the Contractor. Communications by and with Separate Contractors shall be through the Owner. The Contract Documents may specify other communication protocols.

§ 4.2.5 Based on the Architect's evaluations of the Contractor's Applications for Payment, the Architect will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts.

§ 4.2.6 The Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the Work in accordance with Sections 13.4.2 and 13.4.3, whether or not the Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, suppliers, their agents or employees, or other persons or entities performing portions of the Work.

§ 4.2.7 The Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data, and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5, and 3.12. The Architect's review shall not constitute approval of safety precautions or of any construction means, methods, techniques, sequences, or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

§ 4.2.8 The Architect will prepare Change Orders and Construction Change Directives, and may order minor changes in the Work as provided in Section 7.4. The Architect will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

§ 4.2.9 The Architect will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion pursuant to Section 9.8; receive and forward to the Owner, for the Owner's review and records, written warranties and related documents required by the Contract and assembled by the Contractor pursuant to Section 9.10; and issue a final Certificate for Payment pursuant to Section 9.10.

§ 4.2.10 If the Owner and Architect agree, the Architect will provide one or more Project representatives to assist in carrying out the Architect's responsibilities at the site. The Owner shall notify the Contractor of any change in the duties, responsibilities and limitations of authority of the Project representatives.

§ 4.2.11 The Architect will interpret and decide matters concerning performance under, and requirements of, the Contract Documents on written request of either the Owner or Contractor. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness.

§ 4.2.12 Interpretations and decisions of the Architect will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings. When making such interpretations

and decisions, the Architect will endeavor to secure faithful performance by both Owner and Contractor, will not show partiality to either, and will not be liable for results of interpretations or decisions rendered in good faith.

§ 4.2.13 The Architect's decisions on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents.

§ 4.2.14 The Architect will review and respond to requests for information about the Contract Documents. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information.

ARTICLE 5 SUBCONTRACTORS

§ 5.1 Definitions

§ 5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a Separate Contractor or the subcontractors of a Separate Contractor.

§ 5.1.2 A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site. The term "Sub-subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-subcontractor.

§ 5.2 Award of Subcontracts and Other Contracts for Portions of the Work

§ 5.2.1 Unless otherwise stated in the Contract Documents, the Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the persons or entities proposed for each principal portion of the Work, including those who are to furnish materials or equipment fabricated to a special design. Within 14 days of receipt of the information, the Architect may notify the Contractor whether the Owner or the Architect (1) has reasonable objection to any such proposed person or entity or (2) requires additional time for review. Failure of the Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection.

§ 5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

§ 5.2.3 If the Owner or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Architect has no reasonable objection. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. However, no increase in the Contract Sum or Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.

§ 5.2.4 The Contractor shall not substitute a Subcontractor, person, or entity for one previously selected if the Owner or Architect makes reasonable objection to such substitution.

§ 5.3 Subcontractual Relations

By appropriate written agreement, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work that the Contractor, by these Contract Documents, assumes toward the Owner and Architect. Each subcontract agreement shall preserve and protect the rights of the Owner and Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the benefit of all rights, remedies, and redress against the Contractor that the Contractor, by the Contract Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor,

prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement that may be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

§ 5.4 Contingent Assignment of Subcontracts

§ 5.4.1 Each subcontract agreement for a portion of the Work is assigned by the Contractor to the Owner, provided that

- .1 assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor; and
- .2 assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

When the Owner accepts the assignment of a subcontract agreement, the Owner assumes the Contractor's rights and obligations under the subcontract.

§ 5.4.2 Upon such assignment, if the Work has been suspended for more than 30 days, the Subcontractor's compensation shall be equitably adjusted for increases in cost resulting from the suspension.

§ 5.4.3 Upon assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor contractor or other entity. If the Owner assigns the subcontract to a successor contractor or other entity, the Owner shall nevertheless remain legally responsible for all of the successor contractor's obligations under the subcontract.

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

§ 6.1 Owner's Right to Perform Construction and to Award Separate Contracts

§ 6.1.1 The term "Separate Contractor(s)" shall mean other contractors retained by the Owner under separate agreements. The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and with Separate Contractors retained under Conditions of the Contract substantially similar to those of this Contract, including those provisions of the Conditions of the Contract related to insurance and waiver of subrogation.

§ 6.1.2 When separate contracts are awarded for different portions of the Project or other construction or operations on the site, the term "Contractor" in the Contract Documents in each case shall mean the Contractor who executes each separate Owner-Contractor Agreement.

§ 6.1.3 The Owner shall provide for coordination of the activities of the Owner's own forces and of each Separate Contractor with the Work of the Contractor, who shall cooperate with them. The Contractor shall participate with any Separate Contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to its construction schedule deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, Separate Contractors, and the Owner until subsequently revised.

§ 6.1.4 Unless otherwise provided in the Contract Documents, when the Owner performs construction or operations related to the Project with the Owner's own forces or with Separate Contractors, the Owner or its Separate Contractors shall have the same obligations and rights that the Contractor has under the Conditions of the Contract, including, without excluding others, those stated in Article 3, this Article 6, and Articles 10, 11, and 12.

§ 6.2 Mutual Responsibility

§ 6.2.1 The Contractor shall afford the Owner and Separate Contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a Separate Contractor, the Contractor shall, prior to proceeding with that portion of the Work,

promptly notify the Architect of apparent discrepancies or defects in the construction or operations by the Owner or Separate Contractor that would render it unsuitable for proper execution and results of the Contractor's Work. Failure of the Contractor to notify the Architect of apparent discrepancies or defects prior to proceeding with the Work shall constitute an acknowledgment that the Owner's or Separate Contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work. The Contractor shall not be responsible for discrepancies or defects in the construction or operations by the Owner or Separate Contractor that are not apparent.

§ 6.2.3 The Contractor shall reimburse the Owner for costs the Owner incurs that are payable to a Separate Contractor because of the Contractor's delays, improperly timed activities or defective construction. The Owner shall be responsible to the Contractor for costs the Contractor incurs because of a Separate Contractor's delays, improperly timed activities, damage to the Work or defective construction.

§ 6.2.4 The Contractor shall promptly remedy damage that the Contractor wrongfully causes to completed or partially completed construction or to property of the Owner or Separate Contractor as provided in Section 10.2.5.

§ 6.2.5 The Owner and each Separate Contractor shall have the same responsibilities for cutting and patching as are described for the Contractor in Section 3.14.

§ 6.3 Owner's Right to Clean Up

If a dispute arises among the Contractor, Separate Contractors, and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, the Owner may clean up and the Architect will allocate the cost among those responsible.

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 General

§ 7.1.1 Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive or order for a minor change in the Work, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents.

§ 7.1.2 A Change Order shall be based upon agreement among the Owner, Contractor, and Architect. A Construction Change Directive requires agreement by the Owner and Architect and may or may not be agreed to by the Contractor. An order for a minor change in the Work may be issued by the Architect alone.

§ 7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents. The Contractor shall proceed promptly with changes in the Work, unless otherwise provided in the Change Order, Construction Change Directive, or order for a minor change in the Work.

§ 7.2 Change Orders

§ 7.2.1 A Change Order is a written instrument prepared by the Architect and signed by the Owner, Contractor, and Architect stating their agreement upon all of the following:

- .1 The change in the Work;
- .2 The amount of the adjustment, if any, in the Contract Sum; and
- .3 The extent of the adjustment, if any, in the Contract Time.

§ 7.3 Construction Change Directives

§ 7.3.1 A Construction Change Directive is a written order prepared by the Architect and signed by the Owner and Architect, directing a change in the Work prior to agreement on adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions, or other revisions, the Contract Sum and Contract Time being adjusted accordingly.

§ 7.3.2 A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order.

§ 7.3.3 If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:

- .1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
- .2 Unit prices stated in the Contract Documents or subsequently agreed upon;
- .3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or
- .4 As provided in Section 7.3.4.

§ 7.3.4 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.4 shall be limited to the following:

- .1 Costs of labor, including applicable payroll taxes, fringe benefits required by agreement or custom, workers' compensation insurance, and other employee costs approved by the Architect;
- .2 Costs of materials, supplies, and equipment, including cost of transportation, whether incorporated or consumed;
- .3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;
- .4 Costs of premiums for all bonds and insurance, permit fees, and sales, use, or similar taxes, directly related to the change; and
- .5 Costs of supervision and field office personnel directly attributable to the change.

§ 7.3.5 If the Contractor disagrees with the adjustment in the Contract Time, the Contractor may make a Claim in accordance with applicable provisions of Article 15.

§ 7.3.6 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Architect of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

§ 7.3.7 A Construction Change Directive signed by the Contractor indicates the Contractor's agreement therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.

§ 7.3.8 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Architect. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

§ 7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Architect determines, in the Architect's professional judgment, to be reasonably justified. The Architect's interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.

§ 7.3.10 When the Owner and Contractor agree with a determination made by the Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and the Architect will prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.

§ 7.4 Minor Changes in the Work

The Architect may order minor changes in the Work that are consistent with the intent of the Contract Documents and do not involve an adjustment in the Contract Sum or an extension of the Contract Time. The Architect's order for minor changes shall be in writing. If the Contractor believes that the proposed minor change in the Work will

affect the Contract Sum or Contract Time, the Contractor shall notify the Architect and shall not proceed to implement the change in the Work. If the Contractor performs the Work set forth in the Architect's order for a minor change without prior notice to the Architect that such change will affect the Contract Sum or Contract Time, the Contractor waives any adjustment to the Contract Sum or extension of the Contract Time.

ARTICLE 8 TIME

§ 8.1 Definitions

§ 8.1.1 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work.

§ 8.1.2 The date of commencement of the Work is the date established in the Agreement.

§ 8.1.3 The date of Substantial Completion is the date certified by the Architect in accordance with Section 9.8.

§ 8.1.4 The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

§ 8.2 Progress and Completion

§ 8.2.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement, the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

§ 8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, commence the Work prior to the effective date of insurance required to be furnished by the Contractor and Owner.

§ 8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

§ 8.3 Delays and Extensions of Time

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by (1) an act or neglect of the Owner or Architect, of an employee of either, or of a Separate Contractor; (2) by changes ordered in the Work; (3) by labor disputes, fire, unusual delay in deliveries, unavoidable casualties, adverse weather conditions documented in accordance with Section 15.1.6.2, or other causes beyond the Contractor's control; (4) by delay authorized by the Owner pending mediation and binding dispute resolution; or (5) by other causes that the Contractor asserts, and the Architect determines, justify delay, then the Contract Time shall be extended for such reasonable time as the Architect may determine.

§ 8.3.2 Claims relating to time shall be made in accordance with applicable provisions of Article 15.

§ 8.3.3 This Section 8.3 does not preclude recovery of damages for delay by either party under other provisions of the Contract Documents.

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 Contract Sum

§ 9.1.1 The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents.

§ 9.1.2 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed so that application of such unit prices to the actual quantities causes substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

§ 9.2 Schedule of Values

Where the Contract is based on a stipulated sum or Guaranteed Maximum Price, the Contractor shall submit a schedule of values to the Architect before the first Application for Payment, allocating the entire Contract Sum to the various portions of the Work. The schedule of values shall be prepared in the form, and supported by the data to substantiate its accuracy, required by the Architect. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment. Any changes to the schedule of values shall be submitted to the Architect and supported by such data to substantiate its accuracy as the Architect may require, and

unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's subsequent Applications for Payment.

§ 9.3 Applications for Payment

§ 9.3.1 At least ten days before the date established for each progress payment, the Contractor shall submit to the Architect an itemized Application for Payment prepared in accordance with the schedule of values, if required under Section 9.2, for completed portions of the Work. The application shall be notarized, if required, and supported by all data substantiating the Contractor's right to payment that the Owner or Architect require, such as copies of requisitions, and releases and waivers of liens from Subcontractors and suppliers, and shall reflect retainage if provided for in the Contract Documents.

§ 9.3.1.1 As provided in Section 7.3.9, such applications may include requests for payment on account of changes in the Work that have been properly authorized by Construction Change Directives, or by interim determinations of the Architect, but not yet included in Change Orders.

§ 9.3.1.2 Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay a Subcontractor or supplier, unless such Work has been performed by others whom the Contractor intends to pay.

§ 9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage, and transportation to the site, for such materials and equipment stored off the site.

§ 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information, and belief, be free and clear of liens, claims, security interests, or encumbrances, in favor of the Contractor, Subcontractors, suppliers, or other persons or entities that provided labor, materials, and equipment relating to the Work.

§ 9.4 Certificates for Payment

§ 9.4.1 The Architect will, within seven days after receipt of the Contractor's Application for Payment, either (1) issue to the Owner a Certificate for Payment in the full amount of the Application for Payment, with a copy to the Contractor; or (2) issue to the Owner a Certificate for Payment for such amount as the Architect determines is properly due, and notify the Contractor and Owner of the Architect's reasons for withholding certification in part as provided in Section 9.5.1; or (3) withhold certification of the entire Application for Payment, and notify the Contractor and Owner of the Architect's reason for withholding certification in whole as provided in Section 9.5.1.

§ 9.4.2 The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on the Architect's evaluation of the Work and the data in the Application for Payment, that, to the best of the Architect's knowledge, information, and belief, the Work has progressed to the point indicated, the quality of the Work is in accordance with the Contract Documents, and that the Contractor is entitled to payment in the amount certified. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion, and to specific qualifications expressed by the Architect. However, the issuance of a Certificate for Payment will not be a representation that the Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work; (2) reviewed construction means, methods, techniques, sequences, or procedures; (3) reviewed copies of requisitions received from Subcontractors and suppliers and other data requested by the Owner to substantiate the Contractor's right to payment; or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

§ 9.5 Decisions to Withhold Certification

§ 9.5.1 The Architect may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Section 9.4.2 cannot be made. If the Architect is unable to certify payment in the amount of the Application, the Architect will notify the Contractor and Owner as provided in Section 9.4.1. If the Contractor and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Section 3.3.2, because of

- .1 defective Work not remedied in accordance with the Contract Documents;
- .2 third party claims filed or reasonable evidence indicating probable filing of such claims, unless security acceptable to the Owner is provided by the Contractor;
- .3 failure of the Contractor to make payments properly to Subcontractors or suppliers for labor, materials or equipment;
- .4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
- .5 damage to the Owner or a Separate Contractor;
- .6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; ~~or~~
- .7 repeated failure to carry out the Work in accordance with the Contract Documents and/or within the Contract Time;
- .8 failure to supply skilled workers or proper materials or equipment, as determined in the sole discretion of Owner;
- .9 adjudged bankrupt, makes a general assignment for the benefit of its creditors, or a receiver is appointed on account of its insolvency.

§ 9.5.2 When either party disputes the Architect's decision regarding a Certificate for Payment under Section 9.5.1, in whole or in part, that party may submit a Claim in accordance with Article 15.

§ 9.5.3 When the reasons for withholding certification are removed, certification will be made for amounts previously withheld.

§ 9.5.4 If the Architect withholds certification for payment under Section 9.5.1.3, the Owner may, at its sole option, issue joint checks to the Contractor and to any Subcontractor or supplier to whom the Contractor failed to make payment for Work properly performed or material or equipment suitably delivered. If the Owner makes payments by joint check, the Owner shall notify the Architect and the Contractor shall reflect such payment on its next Application for Payment.

§ 9.6 Progress Payments

§ 9.6.1 After the Architect has issued a Certificate for Payment, the Owner shall make payment in the manner and within the time provided in the Contract Documents, and shall so notify the Architect.

§ 9.6.2 The Contractor shall pay each Subcontractor, no later than seven days after receipt of payment from the Owner, the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner.

§ 9.6.3 The Architect will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Architect and Owner on account of portions of the Work done by such Subcontractor.

§ 9.6.4 The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and suppliers amounts paid by the Owner to the Contractor for subcontracted Work. If the Contractor fails to furnish such evidence within seven days, the Owner shall have the right to contact Subcontractors and suppliers to ascertain whether they have been properly paid. Neither the Owner nor Architect shall have an

obligation to pay, or to see to the payment of money to, a Subcontractor or supplier, except as may otherwise be required by law.

§ 9.6.5 The Contractor's payments to suppliers shall be treated in a manner similar to that provided in Sections 9.6.2, 9.6.3 and 9.6.4.

§ 9.6.6 A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

§ 9.6.7 Unless the Contractor provides the Owner with a payment bond in the full penal sum of the Contract Sum, payments received by the Contractor for Work properly performed by Subcontractors or provided by suppliers shall be held by the Contractor for those Subcontractors or suppliers who performed Work or furnished materials, or both, under contract with the Contractor for which payment was made by the Owner. Nothing contained herein shall require money to be placed in a separate account and not commingled with money of the Contractor, create any fiduciary liability or tort liability on the part of the Contractor for breach of trust, or entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision.

§ 9.6.8 Provided the Owner has fulfilled its payment obligations under the Contract Documents, the Contractor shall defend and indemnify the Owner from all loss, liability, damage or expense, including reasonable attorney's fees and litigation expenses, arising out of any lien claim or other claim for payment by any Subcontractor or supplier of any tier. Upon receipt of notice of a lien claim or other claim for payment, the Owner shall notify the Contractor. If approved by the applicable court, when required, the Contractor may substitute a surety bond for the property against which the lien or other claim for payment has been asserted.

§ 9.7 Failure of Payment

If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within seven days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven days after the date established in the Contract Documents, the amount certified by the Architect or awarded by binding dispute resolution, then the Contractor may, upon seven additional days' notice to the Owner and Architect, stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided for in the Contract Documents.

§ 9.8 Substantial Completion

§ 9.8.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use.

§ 9.8.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

§ 9.8.3 Upon receipt of the Contractor's list, the Architect will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion.

§ 9.8.4 When the Work or designated portion thereof is substantially complete, the Architect will prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion; establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance; and fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

§ 9.8.5 The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in the Certificate. Upon such acceptance, and consent of surety if any, the Owner shall make payment of retainage applying to the Work or designated portion thereof. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents.

§ 9.9 Partial Occupancy or Use

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect.

§ 9.9.2 Immediately prior to such partial occupancy or use, the Owner, Contractor, and Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

§ 9.9.3 Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

§ 9.10 Final Completion and Final Payment

§ 9.10.1 Upon receipt of the Contractor's notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection. When the Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's on-site visits and inspections, the Work has been completed in accordance with the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect, (3) a written statement that the Contractor knows of no reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment, (5) documentation of any special warranties, such as manufacturers' warranties or specific Subcontractor warranties, and (6) if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts and releases and waivers of liens, claims, security interests, or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien, claim, security interest, or encumbrance. If a lien, claim, security interest, or encumbrance remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging the lien, claim, security interest, or encumbrance, including all costs and reasonable attorneys' fees.

§ 9.10.3 If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting final completion, and the Architect so confirms, the Owner shall, upon application by the Contractor and certification by the Architect, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed, corrected, and accepted. If

the remaining balance for Work not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of the surety to payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Architect prior to certification of such payment. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

§ 9.10.4 The making of final payment shall constitute a waiver of Claims by the Owner except those arising from

- .1 liens, Claims, security interests, or encumbrances arising out of the Contract and unsettled;
- .2 failure of the Work to comply with the requirements of the Contract Documents;
- .3 terms of special warranties required by the Contract Documents; or
- .4 audits performed by the Owner, if permitted by the Contract Documents, after final payment.

§ 9.10.5 Acceptance of final payment by the Contractor, a Subcontractor, or a supplier, shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of final Application for Payment.

§ 9.11 Prevailing Wages

§ 9.11.1 Contractor shall file a "Statement of Intent to Pay Prevailing Wages," with the State of Washington Department of Labor & Industries prior to commencing the contract workany Work. Contractor shall pay applicable prevailing wages in effect on the date the bid is accepted or as of the date of the Agreement executed by Contractor, and comply with Chapter 39.12 of the Revised Code of Washington, as well as any other applicable prevailing wage rate provisions. The latest prevailing wage rate revision issued by the Department of Labor and Industries is made part of the eContract Documents.

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 Safety Precautions and Programs

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

§ 10.2 Safety of Persons and Property

§ 10.2.1 The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury, or loss to

- .1 employees on the Work and other persons who may be affected thereby;
- .2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody, or control of the Contractor, a Subcontractor, or a Sub-subcontractor; and
- .3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures, and utilities not designated for removal, relocation, or replacement in the course of construction.

§ 10.2.2 The Contractor shall comply with, and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities, bearing on safety of persons or property or their protection from damage, injury, or loss.

§ 10.2.3 The Contractor shall implement, erect, and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards; promulgating safety regulations; and notifying the owners and users of adjacent sites and utilities of the safeguards.

§ 10.2.4 When use or storage of explosives or other hazardous materials or equipment, or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.

§ 10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2 and 10.2.1.3. The Contractor may make a Claim for the cost to remedy the damage or loss to the

extent such damage or loss is attributable to acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

§ 10.2.6 The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner and Architect.

§ 10.2.7 The Contractor shall not permit any part of the construction or site to be loaded so as to cause damage or create an unsafe condition.

§ 10.2.8 Injury or Damage to Person or Property

If either party suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, notice of the injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 21 days after discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter.

§ 10.3 Hazardous Materials and Substances

§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials or substances. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and notify the Owner and Architect of the condition.

§ 10.3.2 Upon receipt of the Contractor's notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of the material or substance or who are to perform the task of removal or safe containment of the material or substance. The Contractor and the Architect will promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. If either the Contractor or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor and the Architect have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable additional costs of shutdown, delay, and start-up.

§ 10.3.3 To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work in the affected area if in fact the material or substance presents the risk of bodily injury or death as described in Section 10.3.1 and has not been rendered harmless, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), except to the extent that such damage, loss, or expense is due to the fault or negligence of the party seeking indemnity.

§ 10.3.4 The Owner shall not be responsible under this Section 10.3 for hazardous materials or substances the Contractor brings to the site unless such materials or substances are required by the Contract Documents. The Owner shall be responsible for hazardous materials or substances required by the Contract Documents, except to the extent of the Contractor's fault or negligence in the use and handling of such materials or substances.

§ 10.3.5 The Contractor shall reimburse the Owner for the cost and expense the Owner incurs (1) for remediation of hazardous materials or substances the Contractor brings to the site and negligently handles, or (2) where the

Contractor fails to perform its obligations under Section 10.3.1, except to the extent that the cost and expense are due to the Owner's fault or negligence.

§ 10.3.6 If, without negligence on the part of the Contractor, the Contractor is held liable by a government agency for the cost of remediation of a hazardous material or substance solely by reason of performing Work as required by the Contract Documents, the Owner shall reimburse the Contractor for all cost and expense thereby incurred.

§ 10.4 Emergencies

In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury, or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7.

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 Contractor's Insurance and Bonds

§ 11.1.1 The Contractor shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Contractor shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Owner, Architect, and Architect's consultants shall be named as additional insureds under the Contractor's commercial general liability policy or as otherwise described in the Contract Documents.

§ 11.1.1.1 The Contractor shall purchase from and maintain the following insurance coverages:

1. Worker's compensation and employer's liability;
2. General liability, on an occurrence basis, including coverage for:
 - Products/completed operations,
 - Ongoing operations, and
 - Personal and advertising injury;
3. Automobile liability on an "any auto" basis.

All required insurance coverages must be written by insurance companies acceptable to Owner. All insurance companies must have a minimum A.M. Best's financial strength rating of A- or better, or an equivalent rating from another respected rating agency, and an A.M. Best's size rating of VII or greater.

§ 11.1.1.2 The insurance policies required by Section 11.1.1.1 shall provide limits no less than the following:

<u>Worker's compensation:</u>	<u>Statutorily required limits</u>
<u>Employer's liability:</u>	<u>\$1,000,000 each accident</u>
	<u>\$1,000,000 disease – each employee</u>
	<u>\$1,000,000 disease – policy limit</u>
<u>General liability</u>	<u>\$1,000,000 each occurrence</u>
	<u>\$1,000,000 personal injury & advertising injury</u>
	<u>\$1,000,000 Project general aggregate</u>
	<u>\$2,000,000 Project product-completed operations aggregate</u>
<u>Automobile liability</u>	<u>\$1,000,000 combined single limit each accident</u>

§ 11.1.2 The Contractor shall provide surety bonds of the types, for such penal sums, and subject to such terms and conditions as required by the Contract Documents. The Contractor shall purchase and maintain the required bonds from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located. The Contractor shall furnish and maintain a One Hundred Percent (100%) performance bond on standard surety bond form. The Contractor shall furnish and maintain a One Hundred Percent (100%) payment bond on standard surety bond form. The bond must state that it is provided pursuant to Ch. 39.08 RCW. Prior to execution of a Change Order, that cumulatively with previous Change Orders, increases the Contract Award Amount Sum by 15% or more, the Contractor shall provide either new payment and performance bonds for the revised Contract Sum, or riders to the existing payment and performance bonds increasing the amount of the bonds. The Contractor shall likewise provide additional bonds or riders when subsequent Change Orders increase the Contract Sum by 15% or

more. No payment or performance bond is required if the Contract Sum is \$35,000 or less and Contractor agrees that Owner may, in lieu of the bond, retain 50% of the Contract Sum for the period allowed by RCW 39.08.010. The surety must agree to be bound by the laws of the state of Washington and subject to the jurisdiction of the state of Washington. Surety must have an A.M. Best rating of A:VII or better per .-(RCW 39.08.010.)

§ 11.1.3 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.

§ 11.1.4 Notice of Cancellation or Expiration of Contractor's Required Insurance. Within three (3) business days of the date the Contractor becomes aware of an impending or actual cancellation or expiration of any insurance required by the Contract Documents, the Contractor shall provide notice to the Owner of such impending or actual cancellation or expiration. Upon receipt of notice from the Contractor, the Owner shall, unless the lapse in coverage arises from an act or omission of the Owner, have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by the Contractor. The furnishing of notice by the Contractor shall not relieve the Contractor of any contractual obligation to provide any required coverage.

§ 11.1.5 The general liability, auto liability and any umbrella or excess liability policy on forms CG 2010 10/01 and CG 2027 10/01 editions or their equivalents that provides coverage excess of the general liability policy must name the Owner as an additional insured. Each such policy must be amended to state clearly that the Contractor's policy will be primary and non-contributory and the Owner's policy will be excess as respects any claim brought against the Owner arising out of the Work. The general liability, auto liability and excess liability policies will provide a Waiver of Subrogation in favor of the Owner and Architects.

§ 11.1.6 No changes that reduce or eliminate coverage provided in standard policy forms (e.g., independent contractors coverage, broad form property damage, contractual liability coverage, etc.) are allowed without the written permission of the Owner.

§ 11.1.7 Coverage shall be maintained without interruption from the date of commencement of the Work until the date of final payment, except completed operations coverage shall be maintained until the expiration of the period for correction of the Work or for two years from date of final payment, whichever is later.

§ 11.1.8 Evidence of each of the required insurance policies is to be provided on ACORD form 25-S. Such certificates of insurance shall be filed with the Owner prior to commencement of the Work and thereafter upon renewal or replacement of each required policy of insurance. These certificates and the insurance policies required by this Section 11.1 shall contain a provision that coverages afforded under the policies will not be canceled until at least 30 days' prior written notice has been given to the Owner. The words "endeavor to" and "but failure to do so shall impose no obligation or liability of any kind upon the insurer, its agents or representatives" are to be deleted from the Cancellation section of the certificates. An additional certificate of insurance evidencing continuation of coverage for completed operations shall be submitted with the final Application for Payment as required by Section 9.10.2 and thereafter upon renewal or replacement of such coverage until the expiration of the time required by this Section 11.1. Information concerning reduction of coverage on account of revised limits or claims paid under the general aggregate, or both, shall be furnished by the Contractor with reasonable promptness.

§ 11.2 Owner's Insurance

§ 11.2.1 The Owner shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Owner shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The aforementioned insurance coverage may be provided by comparable insurance risk pool coverage, authorized by chapter 48.62, as amended.

§ 11.2.2 Failure to Purchase Required Property Insurance. If the Owner fails to purchase and maintain the required property insurance, with all of the coverages and in the amounts described in the Agreement or elsewhere in the Contract Documents, the Owner shall inform the Contractor in writing prior to commencement of the Work. Upon receipt of notice from the Owner, the Contractor may delay commencement of the Work and may obtain insurance that will protect the interests of the Contractor, Subcontractors, and Sub-Subcontractors in the Work. When the

failure to provide coverage has been cured or resolved, the Contract Sum and Contract Time shall be equitably adjusted. In the event the Owner fails to procure coverage, the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent the loss to the Owner would have been covered by the insurance to have been procured by the Owner. The cost of the insurance shall be charged to the Owner by a Change Order. If the Owner does not provide written notice, and the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain the required insurance, the Owner shall reimburse the Contractor for all reasonable costs and damages attributable thereto.

§ 11.2.3 Notice of Cancellation or Expiration of Owner's Required Property Insurance. Within three (3) business days of the date the Owner becomes aware of an impending or actual cancellation or expiration of any property insurance required by the Contract Documents, the Owner shall provide notice to the Contractor of such impending or actual cancellation or expiration. Unless the lapse in coverage arises from an act or omission of the Contractor: (1) the Contractor, upon receipt of notice from the Owner, shall have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by either the Owner or the Contractor; (2) the Contract Time and Contract Sum shall be equitably adjusted; and (3) the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent any loss to the Owner would have been covered by the insurance had it not expired or been cancelled. If the Contractor purchases replacement coverage, the cost of the insurance shall be charged to the Owner by an appropriate Change Order. The furnishing of notice by the Owner shall not relieve the Owner of any contractual obligation to provide required insurance.

§ 11.3 Waivers of Subrogation

§ 11.3.1 The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents, and employees, each of the other; (2) the Architect and Architect's consultants; and (3) Separate Contractors, if any, and any of their subcontractors, sub-subcontractors, agents, and employees, for damages caused by fire, or other causes of loss, to the extent those losses are covered by property insurance required by the Agreement or other property insurance applicable to the Project, except such rights as they have to proceeds of such insurance. The Owner or Contractor, as appropriate, shall require similar written waivers in favor of the individuals and entities identified above from the Architect, Architect's consultants, Separate Contractors, subcontractors, and sub-subcontractors. The policies of insurance purchased and maintained by each person or entity agreeing to waive claims pursuant to this section 11.3.1 shall not prohibit this waiver of subrogation. This waiver of subrogation shall be effective as to a person or entity (1) even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, (2) even though that person or entity did not pay the insurance premium directly or indirectly, or (3) whether or not the person or entity had an insurable interest in the damaged property.

§ 11.3.2 If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, to the extent permissible by such policies, the Owner waives all rights in accordance with the terms of Section 11.3.1 for damages caused by fire or other causes of loss covered by this separate property insurance.

§ 11.4 Loss of Use, Business Interruption, and Delay in Completion Insurance

The Owner, at the Owner's option, may purchase and maintain insurance that will protect the Owner against loss of use of the Owner's property, or the inability to conduct normal operations, due to fire or other causes of loss. The Owner waives all rights of action against the Contractor and Architect for loss of use of the Owner's property, due to fire or other hazards however caused.

§11.5 Adjustment and Settlement of Insured Loss

§ 11.5.1 A loss insured under the property insurance required by the Agreement shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.5.2. The Owner shall pay the Architect and Contractor their just shares of insurance proceeds received by the Owner, and by appropriate agreements the Architect and Contractor shall make payments to their consultants and Subcontractors in similar manner.

§ 11.5.2 Prior to settlement of an insured loss, the Owner shall notify the Contractor of the terms of the proposed settlement as well as the proposed allocation of the insurance proceeds. The Contractor shall have 14 days from

receipt of notice to object to the proposed settlement or allocation of the proceeds. If the Contractor does not object, the Owner shall settle the loss and the Contractor shall be bound by the settlement and allocation. Upon receipt, the Owner shall deposit the insurance proceeds in a separate account and make the appropriate distributions. Thereafter, if no other agreement is made or the Owner does not terminate the Contract for convenience, the Owner and Contractor shall execute a Change Order for reconstruction of the damaged or destroyed Work in the amount allocated for that purpose. If the Contractor timely objects to either the terms of the proposed settlement or the allocation of the proceeds, the Owner may proceed to settle the insured loss, and any dispute between the Owner and Contractor arising out of the settlement or allocation of the proceeds shall be resolved pursuant to Article 15. Pending resolution of any dispute, the Owner may issue a Construction Change Directive for the reconstruction of the damaged or destroyed Work.

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 Uncovering of Work

§ 12.1.1 If a portion of the Work is covered contrary to the Architect's request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by the Architect, be uncovered for the Architect's examination and be replaced at the Contractor's expense without change in the Contract Time.

§ 12.1.2 If a portion of the Work has been covered that the Architect has not specifically requested to examine prior to its being covered, the Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, the Contractor shall be entitled to an equitable adjustment to the Contract Sum and Contract Time as may be appropriate. If such Work is not in accordance with the Contract Documents, the costs of uncovering the Work, and the cost of correction, shall be at the Contractor's expense.

§ 12.2 Correction of Work

§ 12.2.1 Before Substantial Completion

The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, discovered before Substantial Completion and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Architect's services and expenses made necessary thereby, shall be at the Contractor's expense.

§ 12.2.2 After Substantial Completion

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 9.9.1, or by 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, the Contractor shall correct it promptly after receipt of notice from the Owner to do so, unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.5.

§ 12.2.2.2 The one-year period for correction of Work 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 completion of that portion of the Work.

§ 12.2.2.3 The one-year period for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Section 12.2.

§ 12.2.3 The Contractor shall remove from the site portions of the Work that are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.

§ 12.2.4 The Contractor shall bear the cost of correcting destroyed or damaged construction of the Owner or Separate Contractors, whether completed or partially completed, caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents.

§ 12.2.5 Nothing contained in this Section 12.2 shall be construed to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents. Establishment of the one-year period for correction of Work as described in Section 12.2.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

§ 12.3 Acceptance of Nonconforming Work

If the Owner prefers to accept Work that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

§ 12.4 Timing of Corrections for Nonconforming Work

When corrections of defects in the Work are made, the Contractor shall be responsible for correcting all defects in the performance of the work and/or related to the materials in the corrected Work for one (1) year after the acceptance of the corrected Work of the Owner. The Contractor shall start work to commence to remedy or correct the Work such defects within seven (7) days of the Owner's mailed notice of discovery, and shall complete such Work within a reasonable time agreed to by both parties. In emergencies where damage may result from delay or where loss of service may result, such corrections may be made by the Owner, in which case the Contractor shall pay all costs incurred by the Owner to perform the correction of the Work. In the event the Contractor does not accomplish corrections within the time specified, the correction of the Work will be otherwise accomplished by the Owner and all costs of same shall be paid by the Contractor.

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 Governing Law

The Contract shall be governed by the law of the place where the Project is located, excluding that jurisdiction's choice of law rules. If the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 15.4. The Contractor agrees to shall comply with state and federal requirements for the Project, including but not limited to those pertaining to payment of wages and working conditions, in accordance with RCW 39.12.040, the Prevailing Wage Act; the Americans with Disabilities Act of 1990; the Davis-Bacon Act; and the Contract Work Hours and Safety Standards Act providing for weekly payment of prevailing wages, minimum overtime pay, and providing that no laborer or mechanic shall be required to work in surroundings or under conditions which are unsanitary, hazardous, or dangerous to health and safety as determined by regulations promulgated by the Federal Secretary of Labor and the State of Washington.

§ 13.2 Successors and Assigns

§ 13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns, and legal representatives to covenants, agreements, and obligations contained in the Contract Documents. Except as provided in Section 13.2.2, neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempts to make an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

§ 13.2.2 The Owner may, without consent of the Contractor, assign the Contract to a lender providing construction financing for the Project, if the lender assumes the Owner's rights and obligations under the Contract Documents. The Contractor shall execute all consents reasonably required to facilitate the assignment.

§ 13.3 Rights and Remedies

§ 13.3.1 Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights, and remedies otherwise imposed or available by law.

§ 13.3.2 No action or failure to act by the Owner, Architect, or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach thereunder, except as may be specifically agreed upon in writing.

§ 13.4 Tests and Inspections

§ 13.4.1 Tests, inspections, and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules, and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections, and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections, and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of tests, inspections, or approvals that do not become requirements until after bids are received or negotiations concluded. The Owner shall directly arrange and pay for tests, inspections, or approvals where building codes or applicable laws or regulations so require.

§ 13.4.2 If the Architect, Owner, or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection, or approval not included under Section 13.4.1, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection, or approval, by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the Architect may be present for such procedures. Such costs, except as provided in Section 13.4.3, shall be at the Owner's expense.

§ 13.4.3 If procedures for testing, inspection, or approval under Sections 13.4.1 and 13.4.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure, including those of repeated procedures and compensation for the Architect's services and expenses, shall be at the Contractor's expense.

§ 13.4.4 Required certificates of testing, inspection, or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Architect.

§ 13.4.5 If the Architect is to observe tests, inspections, or approvals required by the Contract Documents, the Architect will do so promptly and, where practicable, at the normal place of testing.

§ 13.4.6 Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

§ 13.5 Interest

Payments due and unpaid under the Contract Documents shall bear interest from the date payment is due at the rate the parties agree upon in writing or, in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 Termination by the Contractor

§ 14.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of 30 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, for any of the following reasons:

- .1 Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;
- .2 An act of government, such as a declaration of national emergency, that requires all Work to be stopped;
- .3 Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents; or
- .4 The Owner has failed to furnish to the Contractor reasonable evidence as required by Section 2.2.

§ 14.1.2 The Contractor may terminate the Contract if, through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, repeated suspensions, delays, or interruptions of the entire Work by the Owner as described in Section 14.3, constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365-day period, whichever is less.

§ 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days' notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed, as well as reasonable overhead and profit on Work not executed, and costs incurred by reason of such termination.

§ 14.1.4 If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, or their agents or employees or any other persons or entities performing portions of the Work because the Owner has repeatedly failed to fulfill the Owner's obligations under the Contract Documents with respect to matters important to the progress of the Work, the Contractor may, upon seven additional days' notice to the Owner and the Architect, terminate the Contract and recover from the Owner as provided in Section 14.1.3.

§ 14.2 Termination by the Owner for Cause

§ 14.2.1 The Owner may terminate the Contract if the Contractor

- .1 repeatedly refuses or fails to supply enough properly skilled workers or proper materials;
- .2 fails to make payment to Subcontractors or suppliers in accordance with the respective agreements between the Contractor and the Subcontractors or suppliers;
- .3 repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or
- .4 otherwise is guilty of substantial breach of a provision of the Contract Documents.

§ 14.2.2 When any of the reasons described in Section 14.2.1 exist, and upon certification by the Architect that sufficient cause exists to justify such action, the Owner may, without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

- .1 Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;
- .2 Accept assignment of subcontracts pursuant to Section 5.4; and
- .3 Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

§ 14.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.

§ 14.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall be certified by the Initial Decision Maker, upon application, and this obligation for payment shall survive termination of the Contract.

§ 14.3 Suspension by the Owner for Convenience

§ 14.3.1 The Owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work, in whole or in part for such period of time as the Owner may determine.

§ 14.3.2 The Contract Sum and Contract Time shall be adjusted for increases in the cost and time caused by suspension, delay, or interruption under Section 14.3.1. Adjustment of the Contract Sum shall include profit. No adjustment shall be made to the extent

- .1 that performance is, was, or would have been, so suspended, delayed, or interrupted, by another cause for which the Contractor is responsible; or
- .2 that an equitable adjustment is made or denied under another provision of the Contract.

§ 14.4 Termination by the Owner for Convenience

§ 14.4.1 The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.

§ 14.4.2 Upon receipt of notice from the Owner of such termination for the Owner's convenience, the Contractor shall

- .1 cease operations as directed by the Owner in the notice;
- .2 take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and
- .3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

~~§ 14.4.3 In case of such termination for the Owner's convenience, the Owner shall pay the Contractor for Work properly executed; costs incurred by reason of the termination, including costs attributable to termination of Subcontracts; and the termination fee, if any, set forth in the Agreement. There shall be no termination fee.~~

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 Claims

§ 15.1.1 Definition

A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, a change in the Contract Time, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim. This Section 15.1.1 does not require the Owner to file a Claim in order to impose liquidated damages in accordance with the Contract Documents.

§ 15.1.2 Time Limits on Claims

The Owner and Contractor shall commence all Claims and causes of action against the other and arising out of or related to the Contract, whether in contract, tort, breach of warranty or otherwise, in accordance with the requirements of the binding dispute resolution method selected in the Agreement and within the period specified by applicable law, but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all Claims and causes of action not commenced in accordance with this Section 15.1.2.

§ 15.1.3 Notice of Claims

§ 15.1.3.1 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered prior to expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party and to the Initial Decision Maker with a copy sent to the Architect, if the Architect is not serving as the Initial Decision Maker. Claims by either party under this Section 15.1.3.1 shall be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

§ 15.1.3.2 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party. In such event, no decision by the Initial Decision Maker is required.

§ 15.1.4 Continuing Contract Performance

§ 15.1.4.1 Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents.

§ 15.1.4.2 The Contract Sum and Contract Time shall be adjusted in accordance with the Initial Decision Maker's decision, subject to the right of either party to proceed in accordance with this Article 15. The Architect will issue Certificates for Payment in accordance with the decision of the Initial Decision Maker.

§ 15.1.5 Claims for Additional Cost

If the Contractor wishes to make a Claim for an increase in the Contract Sum, notice as provided in Section 15.1.3 shall be given before proceeding to execute the portion of the Work that is the subject of the Claim. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

§ 15.1.6 Claims for Additional Time

§ 15.1.6.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, notice as provided in Section 15.1.3 shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. In the case of a continuing delay, only one Claim is necessary.

§ 15.1.6.2 If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated, and had an adverse effect on the scheduled construction.

§ 15.1.7 Waiver of Claims for Consequential Damages

The Contractor and Owner waive Claims against each other for consequential damages arising out of or relating to this Contract. This mutual waiver includes

- .1 damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and
- .2 damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit, except anticipated profit arising directly from the Work.

This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 14. Nothing contained in this Section 15.1.7 shall be deemed to preclude assessment of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

§ 15.2 Initial Decision

§ 15.2.1 Claims, excluding those where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2 or arising under Sections 10.3, 10.4, and 11.5, shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. Except for those Claims excluded by this Section 15.2.1, an initial decision shall be required as a condition precedent to mediation of any Claim. If an initial decision has not been rendered within 30 days after the Claim has been referred to the Initial Decision Maker, the party asserting the Claim may demand mediation and binding dispute resolution without a decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

§ 15.2.2 The Initial Decision Maker will review Claims and within ten days of the receipt of a Claim take one or more of the following actions: (1) request additional supporting data from the claimant or a response with supporting data from the other party, (2) reject the Claim in whole or in part, (3) approve the Claim, (4) suggest a compromise, or (5) advise the parties that the Initial Decision Maker is unable to resolve the Claim if the Initial Decision Maker lacks sufficient information to evaluate the merits of the Claim or if the Initial Decision Maker concludes that, in the Initial Decision Maker's sole discretion, it would be inappropriate for the Initial Decision Maker to resolve the Claim.

§ 15.2.3 In evaluating Claims, the Initial Decision Maker may, but shall not be obligated to, consult with or seek information from either party or from persons with special knowledge or expertise who may assist the Initial Decision Maker in rendering a decision. The Initial Decision Maker may request the Owner to authorize retention of such persons at the Owner's expense.

§ 15.2.4 If the Initial Decision Maker requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond, within ten days after receipt of the request, and shall either (1) provide a response on the requested supporting data, (2) advise the Initial Decision Maker when the response or supporting data will be furnished, or (3) advise the Initial Decision Maker that no supporting data will be furnished. Upon receipt of the response or supporting data, if any, the Initial Decision Maker will either reject or approve the Claim in whole or in part.

§ 15.2.5 The Initial Decision Maker will render an initial decision approving or rejecting the Claim, or indicating that the Initial Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties and the Architect, if the Architect is not serving as the Initial Decision Maker, of any change in the Contract Sum or Contract Time or both. The initial decision shall be final and binding on the parties but subject to mediation and, if the parties fail to resolve their dispute through mediation, to binding dispute resolution.

§ 15.2.6 Either party may file for mediation of an initial decision at any time, subject to the terms of Section 15.2.6.1.

§ 15.2.6.1 Either party may, within 30 days from the date of receipt of an initial decision, demand in writing that the other party file for mediation. If such a demand is made and the party receiving the demand fails to file for mediation within 30 days after receipt thereof, then both parties waive their rights to mediate or pursue binding dispute resolution proceedings with respect to the initial decision.

§ 15.2.7 In the event of a Claim against the Contractor, the Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, the Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

§ 15.2.8 If a Claim relates to or is the subject of a mechanic's lien, the party asserting such Claim may proceed in accordance with applicable law to comply with the lien notice or filing deadlines.

§ 15.3 Mediation

§ 15.3.1 Claims, disputes, or other matters in controversy arising out of or related to the Contract, except those waived as provided for in Sections 9.10.4, 9.10.5, and 15.1.7, shall be subject to mediation as a condition precedent to binding dispute resolution.

§ 15.3.2 The parties shall endeavor to resolve their Claims by mediation which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Mediation Procedures in effect on the date of the Agreement. A request for mediation shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the mediation. The request may be made concurrently with the filing of binding dispute resolution proceedings but, in such event, mediation shall proceed in advance of binding dispute resolution proceedings, which shall be stayed pending mediation for a period of 60 days from the date of filing, unless stayed for a longer period by agreement of the parties or court order. If an arbitration is stayed pursuant to this Section 15.3.2, the parties may nonetheless proceed to the selection of the arbitrator(s) and agree upon a schedule for later proceedings.

§ 15.3.3 Either party may, within 30 days from the date that mediation has been concluded without resolution of the dispute or 60 days after mediation has been demanded without resolution of the dispute, demand in writing that the other party file for binding dispute resolution. If such a demand is made and the party receiving the demand fails to file for binding dispute resolution within 60 days after receipt thereof, then both parties waive their rights to binding dispute resolution proceedings with respect to the initial decision.

§ 15.3.4 The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in the place where the Project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof.

§ 15.4 Arbitration

§ 15.4.1 If the parties have selected arbitration as the method for binding dispute resolution in the Agreement, any Claim subject to, but not resolved by, mediation shall be subject to arbitration which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Arbitration Rules in effect on the date of the Agreement. The Arbitration shall be conducted in the place where the Project is located, unless another location is mutually agreed upon. A demand for arbitration shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the arbitration. The party filing a notice of demand for arbitration must assert in the demand all Claims then known to that party on which arbitration is permitted to be demanded.

§ 15.4.1.1 A demand for arbitration shall be made no earlier than concurrently with the filing of a request for mediation, but in no event shall it be made after the date when the institution of legal or equitable proceedings based on the Claim would be barred by the applicable statute of limitations. For statute of limitations purposes, receipt of a written demand for arbitration by the person or entity administering the arbitration shall constitute the institution of legal or equitable proceedings based on the Claim.

§ 15.4.2 The award rendered by the arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.

§ 15.4.3 The foregoing agreement to arbitrate and other agreements to arbitrate with an additional person or entity duly consented to by parties to the Agreement, shall be specifically enforceable under applicable law in any court having jurisdiction thereof.

§ 15.4.4 Consolidation or Joinder

§ 15.4.4.1 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party may consolidate an arbitration conducted under this Agreement with any other arbitration to which it is a party provided that (1) the arbitration agreement governing the other arbitration permits consolidation, (2) the arbitrations to be consolidated substantially involve common questions of law or fact, and (3) the arbitrations employ materially similar procedural rules and methods for selecting arbitrator(s).

§ 15.4.4.2 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party may include by joinder persons or entities substantially involved in a common question of law or fact whose presence is required if complete relief is to be accorded in arbitration, provided that the party sought to be joined consents in writing to such joinder. Consent to arbitration involving an additional person or entity shall not constitute consent to arbitration of any claim, dispute or other matter in question not described in the written consent.

§ 15.4.4.3 The Owner and Contractor grant to any person or entity made a party to an arbitration conducted under this Section 15.4, whether by joinder or consolidation, the same rights of joinder and consolidation as those of the Owner and Contractor under this Agreement.



SPOKANE COUNTY LIBRARY DISTRICT
RETAINAGE INVESTMENT OPTION FORM
PROJECT: ARGONNE HVAC SYSTEMS REPLACEMENT

CONTRACTOR _____

PROJECT NAME _____

PROJECT NUMBER _____

DATE _____

Pursuant to RCW 60.28.011, as amended, you may choose how your retainage under this contract will be held and invested. Please complete and sign this form indicating your preference. If you fail to do so, Spokane County Library District (District) will hold your retainage as described in "Current Expense", Option #1 below:

- ☐ 1.) **Current Expense:** *The District will retain the money in its Current Expense Fund Account until thirty days following final acceptance of the improvement or work as completed. You will not receive interest earned on this money.*
- ☐ 2.) **Interest Bearing Account:** *The District will deposit retainage in an interest bearing account in a bank, mutual saving bank, or savings and loan association, not subject to withdrawal until after the final acceptance of the improvement or work as completed, or until agreed to by both parties. Interest on the account will be paid to you. Any fees incurred shall be the responsibility of the Contractor.*
- ☐ 3.) **Escrow/Investments:** *The District will place the retainage checks in escrow with a bank or trust company until thirty days following the final acceptance of the improvement or work as completed. When the moneys reserved are to be placed in escrow, the District will issue a check representing the sum of the moneys reserved payable to the bank or trust company and you jointly. This check will be converted into bonds and securities chosen by you will be held in escrow. Interest on these bonds and securities will be paid to you as interest accrues. The Contractor in choosing option (3) agrees to assume full responsibility to pay all costs which may accrue from escrow services, brokerage charges or both, and further agrees to assume all risks in connection with the investment of the retained percentages in securities.*
- ☐ 4.) **Retainage Bond:** *The bidder shall post a retainage bond equal to 5% of the total bid price of this. If this option is chosen, the Bidder shall complete the Retainage form supplied in this document.*

With the consent of the District, the Contractor may submit a bond for all or any portion of the amount of funds retained by the District in a form and



SPOKANE COUNTY LIBRARY DISTRICT
RETAINAGE INVESTMENT OPTION FORM
PROJECT: ARGONNE HVAC SYSTEMS REPLACEMENT

from an authorized surety insurer acceptable to the District. Such bond and any proceeds therefrom shall be made subject to all claims and liens and in the same manner and priority as set forth for retained percentages in this chapter. The District shall release the bonded portion of the retained funds to the Contractor within thirty days of accepting the bond from the Contractor. Whenever the District accepts a bond in lieu of retained funds from a Contractor, the Contractor shall accept like bonds from any Subcontractors or suppliers from which the Contractor has retained funds. The Contractor shall then release the funds retained from the Subcontractor or supplier to the Subcontractor or supplier within thirty days of accepting the bond from the Subcontractor or supplier.

Retainage is normally released after final acceptance of the work by the District or following receipt of Washington State Department of Labor & Industries/Revenue/Employment Security, which ever takes longer. Retainage on landscaping work may be retained longer, due to its seasonal nature. State law allows for limited early release in certain circumstances.

CONTRACTOR

Signature: _____

Name: _____

Title: _____

Date: _____



SPOKANE COUNTY LIBRARY DISTRICT
RETAINAGE ESCROW AGREEMENT FORM
PROJECT: ARGONNE HVAC SYSTEMS REPLACEMENT

Escrow No. _____

To: _____

The undersigned, hereinafter referred to as the Contractor, has directed Spokane County Library District, hereinafter referred to as the Agency, to deliver to you its warrants or checks which shall be payable to you and the Contractor jointly. Such warrants or checks are to be held and disposed of by you in accordance with the following instructions and upon the terms and conditions hereinafter set forth.

INSTRUCTIONS

1. The Agency shall deliver to you from time to time, checks or warrants payable jointly to you and the Contractor. You are hereby authorized by the Contractor to endorse in the Contractor's name any such check or warrant so that you may receive the proceeds thereof and invest the same. The power of endorsement hereby granted to you by the Contractor shall be deemed a power coupled with an interest and shall be irrevocable during the term, of this escrow. Although you may be a payee named in such warrants or checks as shall be delivered to you, your duties, and responsibilities with respects to the same shall be only those duties and responsibilities which a depository bank would have, pursuant to Article 4 of the Uniform Commercial Code of the State of Washington for an item deposited with it for collection as of the date such check or warrant shall be delivered to you. The proceeds from collections shall be used by you to purchase, as directed by the Contractor, bonds or other securities as chosen by the Contractor and approved by you and the Agency. For the purpose of each such purchase, you may follow the last written direction received by you from the Contractor, provided such direction otherwise conforms with the restrictions on investments recited herein. Attached is a list of such bonds or other securities approved by the Agency. No further approval is necessary if any securities, except stocks, may be selected by the Contractor, subject to express written approval of you and the Agency. Purchase of such bonds or other securities shall be in a form which shall allow you alone to reconvert such bonds or other securities into money, if you are required to do so by the Agency as provided in paragraph 4 of this Escrow Agreement. The investments selected by the Contractor, approved by the Agency, and purchased by you must mature on or prior to the date set for the completion of the contract, including



SPOKANE COUNTY LIBRARY DISTRICT
RETAINAGE ESCROW AGREEMENT FORM
PROJECT: ARGONNE HVAC SYSTEMS REPLACEMENT

extensions thereof or thirty days following the final acceptance of said improvement or work.

2. When and as interest on the securities held by you pursuant to this agreement accrues and is paid, you shall collect such interest and forward it to the Contractor at its address designated below unless with your written consent you are otherwise directed in writing by the Contractor.
3. You are not authorized to deliver to the Contractor all or any part of the securities held by you pursuant to this agreement or any monies derived from the sale of such securities, or the negotiation of the Agency's warrants or checks except in accordance with written instructions from the Agency. The Agency shall inform you and keep you informed in writing of the name of the person or person with authority to give you such written instructions. Compliance with such instructions shall relieve you of any further liability related thereto. The estimated completion date on the contract underlying this Escrow Agreement is _____. Upon request by you, the Agency shall advise you in writing of any changes in the estimated completion date. If the estimated completion date is changed, you are authorized to reinvest the monies held hereunder in accordance with the new estimated completion date.
4. In the event the Agency orders you to do so in writing, and notwithstanding any other provisions of this agreement, you shall, within thirty-five (35) days of receipt of such order, reconvert into money the securities held by you pursuant to this agreement and return such money, together with any other monies including accrued interest on such securities held by you hereunder, to the Agency.
5. The Contractor agrees to pay you as compensation for your services hereunder as follows: Payment of all fees shall be the sole responsibility of the Contractor and shall not be deducted from any property placed with you pursuant to this agreement until and unless the Agency directs the release to the Contractor of the securities and monies held hereunder whereupon you shall be granted a first lien upon such property released and shall be entitled to reimburse yourself from such property for the entire amount of your fees and any unanticipated amounts which might be owing as provided for herein. In the event that you are made a party to any litigation with respect to the property held by you hereunder, or in the event that the conditions of this escrow are not promptly fulfilled or that you are required to render any services not provided for in these instructions, or that there is any assignment of the interests of this escrow of any modification hereof, you shall be entitled to reasonable compensation for such extraordinary services from the Contractor and reimbursement from the Contractor for



SPOKANE COUNTY LIBRARY DISTRICT
RETAINAGE ESCROW AGREEMENT FORM
PROJECT: ARGONNE HVAC SYSTEMS REPLACEMENT

all costs and expenses, including attorney fees occasioned by such default, delay, controversy or litigation.

6. Should you at any time and for any reason desire to be relieved of your obligations as escrow holder hereunder, you shall give written notice to the Agency and Contractor. The Agency and Contractor shall, within 20 days of the receipt of such notice, jointly appoint a successor escrow holder and instruct you to deliver all securities and funds held hereunder to said successor. If you are notified of the appointment of the successor escrow holder within 20 days, you may return the subject matter hereof to the Agency and upon so doing, it absolves you from all further charges and obligations in connection with this escrow.
7. This agreement shall not be binding until executed by the Contractor and the Agency and accepted by you.
8. This instrument contains the entire agreement between you, the Contractor and the Agency with respect to this escrow and you are not a party to nor bound by any instrument or agreement other than this; you shall not be required to take notice of any default or any other matter, nor be bound by nor require to give notice or demand, nor required to take any action whatever except as herein expressly provided; you shall not be liable for any loss or damage not caused by your own negligence or willful misconduct.
9. The foregoing provisions shall be binding upon the assigns, successors, personal representatives, and heirs to the parties hereto.

The undersigned have read and hereby approve the instructions as given above governing the administration of this escrow and do hereby execute this agreement the day of , 2025.

	_____ Spokane County Library District
Contractor	Agency
By _____	_____
Signature and Title	Signature and Title

Address	

The above escrow instructions received and accepted this _____ day of _____, 2025.



SPOKANE COUNTY LIBRARY DISTRICT
RETAINAGE ESCROW AGREEMENT FORM
PROJECT: ARGONNE HVAC SYSTEMS REPLACEMENT

Bank or Trust Company

By _____

SAMPLE



SPOKANE COUNTY LIBRARY DISTRICT
BOND – CONTRACT FORM
PROJECT: ARGONNE HVAC SYSTEMS REPLACEMENT

Surety to have an **A.M. Best** rating of A:VII or better.

Bond No. _____

KNOW ALL PERSONS BY THESE PRESENTS, that, _____
_____, (Contractor), as Principal, and _____
_____, (insert name of surety), as Surety, a corporation duly organized under the laws of
the State of _____ (insert Surety's state of incorporation), and authorized to
do business as a surety in the State of Washington, are held and firmly bound unto Spokane
County Library District (District) for the use and benefit of claimants as hereinafter defined, in
the sum of _____ Dollars (_____
_____)}, lawful money of the United States of America, plus the total amount of
any extra orders issued by the District, for the payment whereof Principal and Surety bind
themselves, their heirs, executors, administrators, representatives, successors, and assigns,
jointly and severally, firmly by these presents.

WHEREAS, Principal has been awarded, and is about to enter into, a Contract with Spokane
County Library District for **PROJECT NAME: ARGONNE HVAC SYSTEMS REPLACEMENT**, which
contract is by this reference made a part hereof;

WHEREAS, the contract is a public works contract, subject to the provisions of RCW Titles 39
and 60;

NOW, THEREFORE, the conditions of this obligation are such that, if the Principal shall promptly
make payment to all claimants as hereinafter defined, for (a) all labor and material used or
reasonably required for use in the performance of the contract and (b) all taxes, increases, and
penalties incurred on the above-referenced contract under Titles 50, 51, and 82 RCW which may
be due, then this obligation shall be void; otherwise, it shall remain in full force and effect,
subject, however, to the following conditions: A claimant is defined as and includes (a) a person
claiming to have supplied labor or materials for the prosecution of the work provided for in the
contract, including any person having direct contractual relationship with the contractor
furnishing the bond or direct contractual relationship with any subcontractor, or an assignee of
such person, (b) the state with respect to taxes incurred on the above-referenced contract
under Titles 50, 51, and 82 RCW which may be due and (c) any other person or entity as allowed
or required by law.

1. The Principal and Surety hereby jointly and severally agree with the District that every
claimant as herein defined, who has not been paid in full prior to Final Acceptance of the



SPOKANE COUNTY LIBRARY DISTRICT
BOND – CONTRACT FORM
PROJECT: ARGONNE HVAC SYSTEMS REPLACEMENT

project, or materials were furnished by such claimant, has an action on this bond for such sum or sums as may be justly due claimant, and may have execution thereon. The District shall not be liable for the payment of any costs or expenses of any such suit or action.

2. No suit or action shall be commenced hereunder by any claimant (except the state with respect to taxes, increases, and penalties incurred on the above-referenced contract under Titles 50, 51, and 82 RCW which may be due) unless the claimant has sent the written notice required under RCW Title 39 to the Principal and to the District's Purchasing Agent by registered or certified mail, or by hand delivery, no later than 30 days after Final Acceptance of the Project.

The amount of this bond shall be reduced by and to the extent of any payment or payments made in good faith hereunder, inclusive of the payment by Surety of mechanics' liens which may be filed of record against the improvement, whether or not claim for the amount of such lien be presented under and against this bond.

The Surety hereby waives notice of any modification of the contract or extension of time made by the District.

Signed this _____ day of _____, 20____.

Principal: _____

Surety: _____

By: _____

By: _____

Title: _____

Title: _____

Address: _____

Address: _____

City/ST/Zip: _____

City/ST/Zip: _____

Tele: _____

Tele: _____

Note: A power of attorney must be provided which appoints the Surety's true and lawful attorney in fact to make, execute, seal and deliver this performance bond.



SPOKANE COUNTY LIBRARY DISTRICT
BOND – PERFORMANCE FORM
PROJECT: ARGONNE HVAC SYSTEMS REPLACEMENT

Surety to have an **A.M. Best** rating of A:VII or better.

Bond No. _____

KNOW ALL PERSONS BY THESE PRESENTS, that, _____
_____ (Contractor), as Principal, and _____
_____ (insert name of surety), as Surety, a corporation duly organized under the laws of the
State of _____ (insert Surety's state of incorporation), and authorized to
do business as a surety in the State of Washington, are held and firmly bound unto the Spokane
County Library District (District) in the sum of _____
_____ dollars (\$ _____), lawful money of the United States
of America, plus the total amount of extra orders issued by the District to the Principal pursuant
to the terms of the Contract referred to in the next succeeding paragraph hereof, for the
payment whereof Principal and Surety bind ourselves, and our heirs, executors, administrators,
representatives, successors, and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has been awarded, and is about to enter into, a written Contract with
the Spokane County Library District for **PROJECT NAME: ARGONNE HVAC SYSTEMS
REPLACEMENT**, which is hereby made a part of this bond as if fully set forth herein;

NOW, THEREFORE, the condition of this bond is such that:

1. If the Principal shall completely and faithfully perform all of its obligations under the Contract, including any warranties required thereunder, and all modifications, amendments, additions, and alterations thereto, including modifications which increase the contract price or time for completion, with or without notice to the surety;
2. If the Principal shall indemnify and hold the District harmless from any and all losses, liability, damages, claims, judgments, liens, costs, and fees of any type that the District may be subject to because of the failure or default of the Principal (a) in performance of any of the terms, conditions, or obligations of the Contract, including all modifications, amendments, additions, and alterations thereto, and any warranties required thereunder, and/or (b) in the payment for labor, equipment, and materials by satisfying all claims and demands incurred under the Contract, and reimbursing and paying Owner all expenses that Owner may incur in making good any default by the Principal; and
3. If the Principal shall indemnify and hold the District harmless from all claims, liabilities, causes of action, damages and costs, including property damages and personal injuries, resulting from any defect appearing or developing in the material provided or workmanship performed under the Contract;



SPOKANE COUNTY LIBRARY DISTRICT
BOND – PERFORMANCE FORM
PROJECT: ARGONNE HVAC SYSTEMS REPLACEMENT

THEN THIS obligation shall be null and void; otherwise to remain in full force and effect If the District shall declare Principal to be in default of the Contract, and shall so notify Surety, Surety shall, within a reasonable time which shall not exceed 14 days, except for good cause shown, notify the District in writing of the manner in which surety will satisfy its obligations under this Bond.

Nonpayment of the Bond premium will not invalidate this Bond nor shall the District be obligated for the payment thereof. The Surety hereby waives notice of any modification of the Contract or extension of time made by the District.

Signed this _____ day of _____, 20____.

Principal: _____

Surety: _____

By: _____

By: _____

Title: _____

Title: _____

Address: _____

Address: _____

City/ST/Zip: _____

City/ST/Zip: _____

Tele: _____

Tele: _____

Note: A power of attorney must be provided which appoints the Surety's true and lawful attorney-in-fact to make, execute, seal and deliver this performance bond.



SPOKANE COUNTY LIBRARY DISTRICT
LIQUIDATED DAMAGES CHECKLIST
PROJECT: ARGONNE HVAC SYSTEMS
REPLACEMENT

The following is the basis for calculating a reasonable approximation of the daily cost damages to the Owner, should the completion of this construction project exceed the Substantial Completion date. The Contract Completion date is the date written into the contract and/or as adjusted by Change Order.

The damages may change depending upon the variables associated with time. Therefore, some contracts may require more than one liquidated damage amount to calculate a fair estimated cost. In Section I, indicate each condition of probable damage due to time. In Section II, calculate the unit cost for each item listed in Section I, add additional Section II sheets as necessary.

For information on actual damages, see Contract, paragraph 3.5.

SECTION I - Probable Conditions at Time of Damage

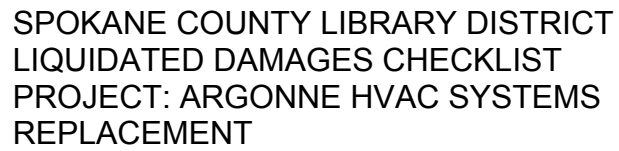
The estimated liquidated damages for this project were calculated based on the following assumptions:

- ☐ A) The Owner will not have occupancy and usage of the project as specified.
- ☐ B) The Owner will have occupancy and usage of the project as intended, but the project is not substantially complete.
- ☐ C) Interim milestones:
 - 1) _____
 - 2) _____
 - 3) _____

SECTION II - Damage calculation for Section I

These estimated damages are based on the time from the scheduled Substantial Completion Date to the actual Substantial Completion Date. All information supporting these estimates should be attached.

	Daily Cost	Notes
1) Temporary Facilities	_____	_____
2) Leasing Costs	_____	_____
3) Rental Costs	_____	_____
4) Utilities	_____	_____
5) A/E Consultant Fees	_____	_____
6) Site Representative Fees	_____	_____
7) Agency Project Management	_____	_____



10) Other costs:

[illegible]

LIQUIDATED DAMAGE TOTAL: \$ 0.00

Notes (Required if liquidated damages in bid documents differs from checklist):

[illegible]

DIVISION 01
GENERAL REQUIREMENTS

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes
 - 1. Description of the Work.
 - 2. Contract description.
 - 3. Project Contacts.
 - 4. Work by Owner or other.
 - 5. Owner-furnished products.
 - 6. Contractor's use of site and premises.
 - 7. Work sequence.
 - 8. Owner occupancy.
 - 9. Permits.
 - 10. Ecological Requirements.
 - 11. Existing Conditions.
 - 12. Archeological Findings.
 - 13. Terms and Definitions.
 - 14. Specification conventions.

1.2 PROJECT

- A. Project Name: Spokane County Library District - Argonne HVAC Upgrades.
- B. Project Location: 4322 N. Argonne Rd, Spokane, WA 99212
- C. The Project consists of the upgrade of HVAC Equipment..

1.3 CONTRACT DESCRIPTION

- A. Work of the Project includes upgrade of existing facility.
- B. Contract Type: A single prime contract based on a Stipulated Price as described in Document 005200 - Agreement Form.

1.4 PROJECT CONTACTS

- A. Owner: Spokane County Library District, 4322 N Argonne Rd, Spokane, WA 99212
- B. Architect: Integrus Architecture, 10 S. Cedar, Spokane, WA 99201, 509.838.8681.
- C. Mechanical and Electrical Engineers: MW Engineers, 602 W 1st Ave, Suite 1300, Spokane WA 99201.

1.5 WORK BY OWNER

- A. If Owner-awarded contracts interfere with each other due to work being performed at the same time or at the same Site, Owner will determine the sequence of work under all contracts according to "Work Sequence" and "Contractor's Use of Site and Premises" Articles in this Section.
- B. Contractor is responsible for scheduling the work, storing such equipment if requested, and coordinating related work in the Contract with installation of NIC and OFOI equipment.
- C. Contractor shall provide all preparatory work necessary for proper installation including blocking and backing, and finish work including caulking, grouting, furring, and painting adjacent surfaces as required for NIC and OFOI equipment. Confirm with Owner work to be done.
- D. The Owner will employ a special inspector to perform the special inspections required as indicated on the drawings.

1.6 OWNER OCCUPANCY

- A. Owner intends to continue to occupy adjacent portions of the existing building during the entire construction period.
- B. Schedule and substantially complete designated portions of the Work for occupancy before Substantial Completion of the entire Work.
- C. Cooperate with Owner to minimize conflict and to facilitate Owner's operations.
- D. Owner's use and occupancy of designated areas before Substantial Completion of the entire Project do not relieve Contractor of responsibility to maintain specified insurance coverages on a 100 percent basis until date of final payment.
- E. Schedule the Work to accommodate Owner occupancy.

1.7 CONTRACTOR USE OF SITE AND PREMISES

- A. Assume full responsibility for the protection and safekeeping of tools, equipment, materials, and products under this Contract, stored on the site.
- B. Assume full responsibility for site security and safety.
- C. Construction Operations: Limited to areas noted on Drawings.

- D. Limit use of Site and premises to allow:
 - 1. Owner occupancy.
 - 2. Work by Owner.
 - 3. Work by Others.
 - 4. Use of Site and premises by the public.
- E. Provide access to and from site as required by law and by Owner:
 - 1. Emergency Building Exits During Construction: Keep all exits required by code open during construction period; provide temporary exit signs if exit routes are temporarily altered.
 - 2. Do not obstruct roadways, sidewalks, or other public ways without permit.
- F. Construction Operations:
 - 1. On-Site work hours: Work hours shall be limited to during hours between 6:00 AM and 8:00 PM.
 - 2. Noisy and Disruptive Operations (such as Use of Jack Hammers and Other Noisy Equipment): Not allowed in close proximity to existing building during regular hours of operation. Coordinate and schedule such operations with Owner to minimize disruptions.
 - 3. Provide positive means to prevent air-borne dust from dispersing into atmosphere and surrounding environment. Cover stockpiled material with tarps, wet down, and take other measures appropriate to minimize raising dust from construction operations..
- G. Existing building spaces may not be used for storage.
- H. Utility Outages and Shutdown:
 - 1. Coordinate and schedule electrical and other utility outages with Owner.
 - 2. Prevent accidental disruption of utility services to other facilities.
 - 3. At least one week before scheduled outage, submit Outage Request Plan to Architect/Engineer itemizing the dates, times, and duration of each requested outage.
- I. Sound Level Restrictions: Comply with all applicable state and local laws, ordinances, and regulations relative to noise control. Sound pressure level measured at boundary of Site shall not exceed 60 dBA.
- J. Construction Plan: Before start of construction, submit Electronic copy of construction plan regarding access to Work, use of Site, and utility outages for acceptance by Owner. After acceptance of plan, construction operations shall comply with accepted plan unless deviations are accepted by Owner in writing.
- K. Keep work and storage areas in a neat, clean and orderly condition at all times. Should it be necessary at any time to move materials or sheds, Contractor shall move same at his expense.

- L. Contractor is responsible for damage to existing property adjacent to the project site and at completion of all work, shall restore/return existing property to its original condition as it was prior to start of project work.
- M. Tobacco products are not permitted on grounds and construction site during the Work of this Contract.

1.8 WORK SEQUENCE

- A. Sequencing of Construction Plan: Before start of construction, submit Electronic copy of construction plan regarding phasing of renovation and new Work for acceptance by Owner. After acceptance of plan, construction sequencing shall comply with accepted plan unless deviations are accepted by Owner in writing. Hours should be limited to not incur overtime, holiday or premium rates.

1.9 ECOLOGICAL REQUIREMENTS

- A. Conform to Washington State Department of Ecology and with local codes and guidelines regarding pollution control, waste reduction and recycling.
- B. Contractor is responsible for securing applicable environmental control permits from all authorities having jurisdiction over construction practices.

1.10 EXISTING CONDITIONS

- A. Utilities of record require field verification and identification. Where unknown utility lines are encountered, protect from damage and do not assume abandoned before identification is made by utility company. Notify Architect of unauthorized cutting or other damage to utility lines resulting from construction activity and promptly take such measures as directed to make reparation.
- B. Surveys and reports of existing topographical and subsurface conditions, including locations of utilities, are provided without warranty as to their accuracy or completeness and are intended as general reference to probable conditions.
- C. Where existing conditions differ from that indicated by Contract Documents:
 - 1. Document and notify Architect immediately of differing conditions.
 - 2. Coordinate and distribute corrections prior to preparing Shop Drawings and before beginning work dependent upon accurate knowledge of conditions.

1.11 TERMS AND DEFINITIONS

- A. The term 'indicated' is a cross reference to details, notes or schedules on the drawings, other paragraphs or schedules in the Project Manual, and similar means of recording requirements in the contract documents.
- B. Where terms such as 'shown,' 'noted,' 'scheduled' and 'specified' are used in lieu of 'indicated,' it is for the purpose of helping the readers accomplish the cross reference and no limitation of location is intended except as specifically noted.

- C. Where not otherwise explained, terms such as 'directed,' 'requested,' 'authorized,' 'selected,' 'approved,' 'required,' 'accepted,' and 'permitted' mean 'directed by the Architect,' 'requested by the Architect,' etc. However, no such implied meaning will be interpreted to extend the Architect's responsibility into the Contractor's area of construction supervision.
- D. The meaning of the word 'approve,' where used in conjunction with Architect's response to submittals, requests, applications, inquiries, reports and claims by Contractor, will be held to limitations of Architect's responsibilities and duties as specified in the Conditions of the Contract. In no case will 'approval' by Architect be interpreted as a release of Contractor from responsibilities to fulfill requirements of the Contract Documents.
- E. The word 'installer' is a person or entity engaged by the Contractor or his subcontractor or sub-subcontractor for the performance of a particular unit of work at the project site, including installation, erection, application and similar required operations. It is a general requirement that Installers be recognized experts in the work they are engaged to perform.
- F. The word 'provide' means to furnish and install.

1.12 SPECIFICATION CONVENTIONS

- A. These Specifications are written in imperative mood and streamlined form. This imperative language is directed to Contractor unless specifically noted otherwise. The words "shall be" are included by inference where a colon (:) is used within sentences or phrases.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes

1. Procedures for preparation and submittal of applications for progress payments.
2. Schedule of Values.
3. Application for Payment.
4. Documentation of changes in Contract Sum and Contract Time.
5. Defect Assessment.

1.2 SCHEDULE OF VALUES

- A. Use Schedule of Values Form: AIA G703, edition stipulated in the Agreement.
- B. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit draft to Architect for approval.
- C. Forms filled out by hand will not be accepted.
- D. Submit electronic file of schedule on AIA G703 - Continuation Sheet for G702.
- E. Submit Schedule of Values in duplicate within 15 days after date of Owner-Contractor Agreement.
- F. Format: Utilize the Table of Contents of this Project Manual. Identify each line item with number and title of the specification section. Identify site mobilization.
- G. Show line items of indirect costs, and margins of actual costs, only to extent such items will be individually listed in payment requests. In general, establish each item in schedule of values (and in payment requests) to be complete with its total expenses and proportionate share of general overhead and profit margin.
- H. Include in each line item, the amount of Allowances specified in this section.
- I. Include separately from each line item, a direct proportional amount of Contractor's overhead and profit.
- J. Revise schedule to list approved Change Orders, with each Application For Payment.
- K. Provide at least one line item for each listed specification section beginning with Division 2. Coordinate applicable activities with Section 013216 - Construction Progress Schedule.
- L. List separate line items for General, Mechanical, and Electrical close-out (which includes Operation and Maintenance manuals) and include the dollar amount equal to 2% of each portion of the contract.

M. Round-off line item amounts to nearest whole dollar.

N. Identify "Separately Funded Work" and amounts.

1.3 APPLICATIONS FOR PROGRESS PAYMENTS

A. Payment Period: Submit at intervals stipulated in the Agreement.

B. Submit electronic file of each Application for Payment on AIA G702 - Application and Certificate for Payment and AIA G703 - Continuation Sheet for G702.

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

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

E. Execute certification by signature of authorized officer.

F. Submit one electronic and three hard-copies of each Application for Payment.

G. Application for Initial Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:

1. Statement of Intent to Pay Prevailing Wages on Public Works Contract on form issued by the State of Washington, Department of Labor and Industries.
2. List of subcontractors including phone numbers, business address, and contact person.
3. Schedule of Values.
4. Contractor's Construction Schedule (preliminary if not final).
5. Products list.
6. Schedule of Unit Prices, as applicable.
7. Submittals Schedule (preliminary if not final).
8. Initial progress report.
9. Certificates of insurance and insurance policies.
10. Performance and payment bonds.
11. List of emergency contact information.
12. Other documents as may be required in the Contract Documents.

H. Draft Payment Application:

1. Submit prior to each application of payment.

2. Prepare the actual payment request after the draft amounts are reviewed and agreed to by the Architect and Owner.
- I. Application for Monthly Payment: Submit on date each month as agreed between Owner and Contractor.
 1. Content and Format: Use Schedule of Values for listing items in Application for Payment.
 2. Submit updated construction schedule with each Application for Payment.
 3. Payment Period: Submit at intervals stipulated in the Agreement.
 4. Submit submittals with transmittal letter as specified in Section 013300 - Submittal Procedures.
- J. Substantiating Data: When Architect/Engineer requires substantiating information, submit data justifying dollar amounts in question. Include the following with Application for Payment:
 1. Current construction photographs specified in Section 013300 - Submittal Procedures.
 2. Conditional and unconditional lien releases from major Subcontractors and vendors.
 3. Record Documents as specified in Section 017000 - Execution and Closeout Requirements, for review by Owner, which will be returned to Contractor.
 4. Affidavits attesting to off-Site stored products.
 5. Construction Progress Schedule, revised and current as specified in Section 013300 - Submittal Procedures.
- K. Contract Retainage Value: Retainage will be paid when all releases have been obtained from state agencies. Contractor must invoice for retainage separately.
- L. Application at time of Substantial Completion: Show one hundred percent (100%) completion for portion of the Work claimed as substantially complete.
 1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
 2. Submit documentation that Waste Management goals (017419) have been met.
- M. Application for Final Payment:
 1. Complete and submit accepted documents as required by the General Conditions of the Contract for Construction.

1.4 DEFECT ASSESSMENT

- A. Replace the Work, or portions of the Work, not conforming to specified requirements.

- B. If, in the opinion of Architect/Engineer, it is not practical to remove and replace the Work, Architect/Engineer will direct appropriate remedy or adjust payment.
- C. Individual Specification Sections may modify these options or may identify specific formula or percentage sum/price reduction.
- D. Authority of Architect/Engineer to assess defects.
- E. Nonpayment for Rejected Products: Payment will not be made for rejected products for any of the following reasons:
 - 1. Products wasted or disposed of in a manner that is not acceptable.
 - 2. Products determined as unacceptable before or after placement.
 - 3. Products not completely unloaded from transporting vehicle.
 - 4. Products placed beyond lines and levels of the required Work.
 - 5. Products remaining on hand after completion of the Work.
 - 6. Loading, hauling and disposing of rejected products.

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes
 - 1. Quality assurance.
 - 2. Product options.
 - 3. Product substitution procedures.
 - 4. Substitution Request Form.

1.2 DEFINITIONS AND OPTIONS

- A. Performance, Reference Standard, and Descriptive Specifications:
 - 1. Manufacturer is not specified and requirements are specified purely by descriptive requirements, design requirements, performance requirements, reference standards, or codes.
 - 2. Products and options meeting or exceeding specified provisions are accepted.
- B. Open Proprietary Specifications:
 - 1. Products by one or more manufacturers are specified and specification makes provision for substitution requests.
 - 2. Conform to provisions for making substitution request as specified by this Section.
- C. Closed Proprietary Specifications:
 - 1. Products by one or more manufacturers are specified and specification Section does include provision for substitution requests.
 - 2. Provide work as specified. No substitution will be accepted.
- D. Basis -of-Design Specifications:
 - 1. Where a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other named manufacturers.
 - 2. Provide either the specified product or a comparable product by one of the other named acceptable manufacturers. Drawings and specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with Comparable Product definition below. Substitutions will be considered only when Section 012500 Substitution Procedures is referred to.

- E. Comparable Product: Product that is demonstrated and approved through submittal process, or where indicated as a product substitution to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

1.3 QUALITY ASSURANCE

- A. Contract is based on products and standards established in Contract Documents without consideration of proposed substitutions.
- B. Products specified define standard of quality, type, function, dimension, appearance, and performance required.
- C. Substitution Proposals: Permitted for specified products except where specified otherwise. Do not substitute products unless substitution has been accepted and approved in writing by Owner.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

- A. A Substitution Request for products, assemblies, materials, and equipment constitutes a representation that the submitter:
 - 1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product, equipment, assembly, or system.
 - 2. Agrees to provide the same warranty for the substitution as for the specified product.
 - 3. Agrees to provide same or equivalent maintenance service and source of replacement parts, as applicable.
 - 4. Agrees to coordinate installation and make changes to other work that may be required for the work to be complete, with no additional cost to Owner.
 - 5. Waives claims for additional costs or time extension that may subsequently become apparent.
 - 6. Agrees to reimburse Owner and Architect for review or redesign services associated with re-approval by authorities.
- B. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents. Burden of proof is on proposer. Include:
 - 1. Manufacturer's name and address, product, trade name, model, or catalog number, performance and test data, and reference standards.
 - 2. Submit Shop Drawings, Product Data, and certified test results attesting to proposed product equivalence. Burden of proof is on proposer.

3. Itemized point-by-point comparison of proposed substitution with specified product, listing variations in quality, performance, and other pertinent characteristics.
 4. Reference to Article and Paragraph numbers in Specification Section.
 5. Cost data comparing proposed substitution with specified product and amount of net change to Contract Sum.
 6. Changes required in other Work.
 7. Availability of maintenance service and source of replacement parts as applicable.
 8. Samples when applicable or requested.
 9. Submit list of at least 3 projects where proposed substitution has been used within past 12 months. Include name, address, and telephone number of Owner and Architect.
 10. Other information as necessary to assist Architect/Engineer's evaluation.
- C. Content: Include information necessary for tracking the status of each Substitution Request, and information necessary to provide an actionable response.
1. Forms indicated in the Project Manual are adequate for this purpose, and must be used.
 2. Submit requests for substitutions on form attached to end of this Section (an electronic version of this form is available from the Architect upon request).
 3. Submit electronic files to Project website of Request for Substitution for consideration. Limit each request to one proposed substitution.
- D. Limit each request to a single proposed substitution item.

3.2 SUBSTITUTION PROCEDURES DURING PROCUREMENT

- A. Substitution Requests During Bidding Phase
1. Submit Substitution Request to reach Owner's office before 5 p.m. at least 10 working days prior to date for receiving Bids.
 2. Bidders will be notified of accepted substitutions by Addendum. No other form of acceptance is valid, including as stated verbally, written, emailed, faxed, or implied in other manner and bidders shall not rely upon any approval not incorporated into the Contract Documents in this manner.
- B. Submittal Form (before award of contract):
1. Submit substitution requests by completing the form attached to this section. See this form for additional information and instructions. Use only this form; other forms of submission are unacceptable.

3.3 SUBSTITUTION PROCEDURES DURING CONSTRUCTION

A. Substitution Requests During Construction

1. Submit Substitution Requests directly by or through Contractor to Architect.
2. Substitution Requests following Bid Date will not be considered, except at discretion of Owner and subject to reimbursement for Architect's review. Review fee will apply whether or not substitution request is accepted.
 - a. Exception: Substitution Requests may be reviewed in the event of special circumstances beyond Contractor's control. Reason for substitution request must be submitted on the attached Substitution Request Form.
3. Reasons for consideration of substitutions include:
 - a. Unavailability: Specified item has been discontinued; there are no available qualified installers; or lead-time is prohibitive relative to project schedule.
 - b. Unsuitability: Subsequent information discloses specified item as unsuitable, inappropriate, unable to perform properly, or to fit designated space.
 - c. Regulatory Requirements: Specified item fails to conform to building code interpretations or insurance regulations.
 - d. Warranty: Manufacturer or fabricator has declared that specified item is unsuitable for intended use or refuses to certify or warrant performance of specified item for condition of use.
 - e. Owner Prerogative: As requested by Owner for reduction of Contract Cost or Contract Time.
4. Contractor will be notified by Architect on the form provided by the Contractor within two weeks of receipt of request, of decision to accept or reject Substitution Request.

B. Submittal Form (after award of contract):

1. Submit substitution requests by completing the form attached to this section. See this section for additional information and instructions. Use only this form; other forms of submission are unacceptable.

3.4 RESOLUTION

- A. Architect may request additional information and documentation prior to rendering a decision. Provide this data in an expeditious manner.
- B. Architect will notify Contractor in writing of decision to accept or reject request.

3.5 ACCEPTANCE

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

3.6 UNACCEPTABLE SUBSTITUTIONS

- A. Substitutions not accepted in writing by Architect.
- B. Substitutions that are not submitted on Substitution Request Form or facsimile following this Section.
- C. Substitution Requests that do not provide complete, adequate, or clearly defined information for a thorough and timely evaluation.
- D. Substitutions that, if accepted, will require substantial revisions to Contract Documents.
- E. Substitutions that are shown or implied by shop drawings and other submittals.
- F. Substitutions not accepted by published Addenda during Bidding Period and not accepted in writing by Architect during Construction Period.
- G. Substitutions installed into the Work and not accepted by Architect, constitute non-conforming work and may be rejected by Owner without further discussion or explanation.

3.7 CLOSEOUT ACTIVITIES

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

3.8 ATTACHMENTS

- A. A facsimile of the Substitution Request Form (During Construction) required to be used on the Project is included after this section.

END OF SECTION

SUBSTITUTION REQUEST FORM

PROJECT: Spokane County Library District – Argonne HVAC Upgrades

SPECIFIED ITEM:

Section	Page	Paragraph	Description

The undersigned requests consideration of the following:

PROPOSED SUBSTITUTION: _____

Attached data includes product description, specifications, drawings, photographs, performance and test data adequate for evaluation of the request; applicable portions of the data are clearly identified.

Attached data also includes description of changes to Contract Documents that the proposed substitution will require for its proper installation.

Attach list of at least 3 projects where proposed substitution has been used within past 12 months. Include name, address, and telephone number of Owner and Architect.

The undersigned certifies that the following paragraphs, unless modified by attachments, are correct:

1. The proposed substitution does not affect dimensions shown on Drawings.
2. The undersigned will pay for changes to the building design, including engineering design, detailing and construction costs caused by the requested substitution.
3. The proposed substitution will have no adverse affect on other trades, the construction schedule, or specified warranty requirements.
4. Maintenance and service parts will be locally available for the proposed substitution.

The undersigned further states that the function, appearance and quality of the proposed substitution are equivalent or superior to the specified item.

Submitted by:

Name (Printed)

Signature

Firm Name

Address

City, State, Zip

Date

Telephone

For use by the A/E:

☐ Accepted

☐ Accepted as
noted

☐ Not Accepted ☐ Received too late

By

Date

Remarks

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Initial Requirements
2. Initiating and Proposing Changes
3. Architect's Supplemental Instructions
4. Documentation of Change in Contract Sum and Contract Time.
5. Approval or Rejection of Proposal
6. Construction Change Directive
7. Change Order
8. Allowance for Overhead and Profit
9. Correlation of Contractor Submittals

1.2 INITIAL REQUIREMENTS

- A. Within 30 days of the Notice to Proceed, the Contractor shall submit a list of all equipment anticipated to be used on the project and whether it is owned or to be rented, using a form acceptable to the Architect and Owner. If during the construction process additional equipment is brought to the Project site, the Contractor shall submit an updated list.
- B. Submit name of individual authorized to receive Change Documents, and to be responsible for informing others in Contractor's employ and to applicable subcontractors of changes to the Work.

1.3 INITIATING AND PROPOSING CHANGES

- A. Proposal Request: Issued by the Architect to the Contractor on the Owner's behalf including a detailed description of proposed change with supplementary or revised Drawings and specifications, a change in Contract Time for executing the change with stipulation of overtime work required and the period of time during which the requested price will be considered valid. Contractor will prepare and submit estimate within seven days.
 1. Proposal Requests are for information only. Do not consider them as an instruction (direction) either to stop work in progress or to execute the proposed change.

- B. Contractor Initiated Change Request: Describe proposed change and its full effect on the Work. Include a statement describing reason for the change, and effect on Contract Sum and Contract Time with full documentation and a statement describing effect on Work by separate or other Contractors. Document requested substitutions in accordance with Section 012500 - Substitution Procedures.
 - 1. Contractor is to do no work on the proposed change until the Change Request is formalized by a Construction Change Directive or Change Order.

1.4 ARCHITECT'S SUPPLEMENTAL INSTRUCTIONS (ASI)

- A. The Architect will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or Contract Time, on a form prepared by the Architect. If the Contractor believes a cost is associated with the supplemental instructions, the Contractor is to provide written notice to the Architect within 7 days of receipt of the instructions, outlining all associated costs as outlined in Part 1.4 DOCUMENTATION OF CHANGE IN CONTRACT SUM.

1.5 DOCUMENTATION OF CHANGE IN CONTRACT SUM AND CONTRACT TIME

- A. Change Order Proposal (COP): Submit electronically information required for Architect's evaluation of proposed changes.
- B. Contract Time: No additional funds will be issued or considered payable to the Contractor for time extension claims prior to Substantial Completion.
- C. Support each lump sum proposal quotation, and each unit price (not previously established) with sufficient substantiating data.
 - 1. On request, provide additional data to support time and cost computations:
 - a. Labor required.
 - b. Equipment required.
 - c. Products required.
 - 1) Recommended source of purchase and unit cost.
 - 2) Quantities required.
 - d. Taxes, insurance, and bonds.
 - e. Documented credit for work deleted from Contract.
 - f. Overhead and profit.
 - g. Justification for any change in Contract Time.
 - 2. Submit additional substantiating data to support computations, as requested by Architect.

3. Support each proposal for additional costs, and time-and-material work, with documentation, as required for lump-sum proposal. Include additional information:
 - a. Name of Architect or Owner's authorized agent who ordered work, and date of order.
 - b. Dates and times work was performed, and by whom (firm or individual).
 - c. Time record, summary of hours worked, and hourly rates paid.
 - d. Receipts and invoices for:
 - 1) Equipment used, listing dates and times of use.
 - 2) Products used and listing of quantities.
 - 3) Subcontracted work.
4. Document Requests for Substitutions.
5. Statement as to whether overtime work is, or is not, necessary.

1.6 APPROVAL OR REJECTION OF PROPOSAL

- A. When change is initiated by Architect or Owner:
 1. Contractor to submit a detailed proposal in writing. Quotation (cost estimate) must be guaranteed for period specified in Proposal Request beginning from signing of proposal. If no period is specified, guarantee quotation for sixty (60) days from signing.
 2. Architect and/or Owner will review the proposal and respond in writing with one of the following:
 - a. Request for additional information.
 - b. Approval to be issued by CCD for subsequent inclusion in a Change Order.
 - c. Rejection of the proposal and direction to continue with contracted work.
 3. Contractor may not proceed with the proposed changed work until a signed CCD or Change Order is received from the Owner.
- B. When a change proposal is initiated by Contractor:
 1. The Architect and/or Owner will review it and respond in writing with one of the following:
 - a. Approve the Contractor's cost proposal;
 - b. Request additional information;
 - c. Reject the proposal.

2. If the Owner responds by approving the Contractor's change proposal, a CCD will be processed.
 - a. If additional information is requested by Owner, respond in writing within fifteen (15) days of Owner's request.
- C. Concurrence of the Building Official:
 1. Note that all significant modifications to the Contract Documents reviewed by the AHJ, including Change Orders "approved" by the Architect and Owner, must also be approved by the Building Official.
 2. Any significant changes, such as structural changes and life safety modifications, will be submitted for review and approval to the AHJ. Contractor may not proceed with such work until the AHJ has reviewed the change and indicated that it is acceptable.

1.7 CONSTRUCTION CHANGE DIRECTIVE (CCD)

- A. Construction Change Directive:
 1. May be issued by Architect with Owner's approval, instructing Contractor to proceed with change in the Work, for subsequent inclusion in a Change Order.
 2. Will describe changes in work, and will designate method of determining change in Contract Sum or Contract Time.
- B. Contractor: Promptly execute change to the Work.
- C. Claims for Adjustments to Contract Time or Contract Sum:
 1. Burden of proof is upon Contractor to submit data substantiating requested increase of Contract Sum and Contract Time for inclusion into approved Change Order.
 2. Submit claims within 30 days after completion of Construction Change Directive. Claims after this time are invalid.
- D. Overhead and Profit for Change to Contract Sum: Conform to provisions of Contract Documents, including the General Conditions.
- E. Prevailing Wages: Limit direct costs for labor, wages, and fringe benefits to amounts indicated by Conditions of the Contract including the General Conditions and prevailing wage rate requirements.

1.8 CHANGE ORDER (CO)

- A. Stipulated Sum Change Order
 1. Based on Proposal Request and Contractor's fixed maximum price quotation or Contractor's request for change.

2. Execute Change Order for changes to the Work affecting Contract Sum or Contract Time.
- B. Unit Price Change Order
 1. Pre-determined Unit Prices and Quantities: Execute Change Order executed on fixed unit price bases.
 2. Unit Costs or Quantities of Units of Work Which are not Pre-Determined: Execute Work under a Construction Change Directive.
 3. Changes in Contract Sum or Contract Time: Compute as specified for a Time and Materials Change Order.
- C. Time and Material Change Order
 1. Submit itemized account and supporting data after completion of change, within time limits indicated in Conditions of the Contract.
 2. Allowable Change to Contract Sum and Contract Time: As determined by Architect under provisions of Contract Documents, including the General Conditions.
 3. Maintain detailed records of work done on Time and Material basis. Provide full information required for evaluation of proposed changes, and to substantiate costs for changes in the Work.
- D. Execution of Change Orders: Architect will issue Change Orders for signatures of parties as provided in Conditions of the Contract.

1.9 CORRELATION OF CONTRACTOR SUBMITTALS

- A. Promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as separate line item and adjust Contract Sum/Price.
- B. Promptly revise progress schedules and applicable sub-schedules to reflect change in Contract Time and to adjust times for other items of work affected by the change, and resubmit.
- C. Promptly enter changes in Project Record Documents.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Construction Organization.
 - 2. Cooperation and Coordination of Work.
 - 3. Project Coordination and Scheduling Control.
 - 4. Mechanical and Electrical Coordination.
 - 5. Job Site Field Measurements And Templates.
 - 6. Dimensions.
 - 7. Intent of Drawings.
 - 8. Interferences and Right of Way.
 - 9. Notification and Correction of Defective Work.
 - 10. Coordination Utilities.
 - 11. Closeout Coordination.

1.2 GENERAL COORDINATION REQUIREMENTS

- A. Coordinate scheduling, submittals and work identified in the Contract to assure efficient and orderly sequence of installation of construction elements, with provisions for accommodating items to be installed later.
- B. Coordinate work between all Sections of Contract Documents to avoid conflicts and omissions. Take special care to coordinate work indicated as Architectural, Mechanical, Electrical and other major Divisions of the Contract Documents.
- C. Responsibility
 - 1. The Contractor shall be in charge of this Contract and the site, as well as the directing and scheduling of all Work. Contractor shall be on site at all times work of this Contract is in progress. Do not delegate responsibility for coordination to any subcontractor.
 - 2. Anticipate interrelationship of all subcontractors and their relationship with the total Work.
 - 3. Resolve differences or disputes between subcontractors and materials suppliers concerning coordination, interference, or extent of Work between Sections. Contractor's decisions, if consistent with Contract Document requirements, shall be final.

4. Final responsibility for the performance, interface, and completion of the Work and the Project in accordance with the Contract Documents shall be with the Contractor.
- D. Prior to any work beginning on the site, the Contractor shall submit, and receive final approval on:
 1. Construction schedule;
 2. All required plans, including, but not limited to, safety, demolition, quality control, waste management and indoor air quality.
 3. All materials to be used on the project in accordance with Section 013300 - Submittal Procedures.

1.3 SPECIAL COORDINATION

- A. There are occupied spaces outside of the limits of construction. These spaces will not be vacated for construction during this contract. Any work in these surrounding areas must be coordinated with the Owner and the occupants of the adjacent areas.
- B. Additional special requirements and conditions apply to the work of this contract. Refer to Section 015000 - Temporary Facilities and Controls, for detailed description of these additional requirements and conditions.
- C. The Owner may require access to the site to perform work related or unrelated to the project. The Contractor shall coordinate with the Owner to accommodate such work within the contract time.

1.4 COORDINATION SHOP DRAWINGS

- A. Prepare Coordination Drawings if limited space availability necessitates maximum utilization of space for efficient installation of different components or if coordination is required for installation of products and materials fabricated by separate entities.
 1. Indicate relationship of components shown on separate Shop Drawings.
 2. Indicate required installation sequences.

1.5 CONSTRUCTION ORGANIZATION

- A. On-Site Lines Of Authority & Communications: Refer to Section 013115 - Communication.
- B. Intra-Project Communications:
 1. Submittals.
 2. Reports and records.
 3. Recommendations.
 4. Coordination drawings.

5. Schedules.
 6. Resolution of conflicts.
- C. Construction Mobilization
1. Cooperate with the Owner's Representative in allocation of mobilization areas of the site; for field offices and sheds, for access, traffic and parking facilities.
 2. Comply with Architect and Owner's Representative's procedures for intra-project communications.
 3. Coordinate field engineering and layout work under instructions of Owner's Representative.
- D. Coordination of Reports/Activities: Coordinate both the procedural timing and the listing (naming and sequencing) of reports/activities required by provisions of this Section and other sections, to afford consistency and logical coordination between submitted reports or lists. Maintain coordination and correlation between separate reports by updating at monthly or shorter time intervals. Distribute each report and updated report to entities involved in the work, including Architect and Owner's Representative. In particular, provide close coordination of Progress Schedule, Schedule of Values (see Section 012000 - Price and Payment Procedures), listing of subcontracts, schedule of submittals, progress reports, and payment requests.
- E. Coordination of Submittals
1. Schedule and coordinate submittals specified in the Contract Documents.
 2. Coordinate work of various Sections having interdependent responsibilities for installing, connecting to and placing equipment in service.
 3. Coordinate request for substitutions to assure compatibility of space, operating elements, and effect on work of other Sections.
- F. Coordination & Pre-Installation Meetings: Refer to Section 013119 - Project Meetings.
- G. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials.
1. Salvage materials and equipment involved in performance of, but not actually incorporated into the Work.

PART 2 PRODUCTS

2.1 NOT USED.

PART 3 EXECUTION

3.1 COOPERATION & COORDINATION OF WORK

- A. The Contractor is responsible for the coordination of the work of all trades; coordinating the installation of their work and that of all subcontractors to ensure compliance with the Contract Documents and to expedite the progress of the Project. Contractor shall check specifications, addenda, and drawings covering all trades as the work progresses. Contractor shall promptly report to the Architect what they consider omissions, conflicts or points requiring clarification.
- B. Contractor shall prepare and distribute to each entity performing work at project site, a written memorandum of instructions on required coordination activities, including required notices, reports and attendance at meetings.
- C. Enclosure of the Work: The Contractor shall coordinate enclosure of work with required inspections and tests, so as to avoid the necessity of uncovering work for that purpose.
- D. It is the responsibility of the Contractor to ensure that the work of subcontractors complies with Conditions of the Contract, Division 1 - General Requirements, and the work of other Sections related to their own work. No additional payments or time extensions will be authorized for failure on the part of subcontractors to be familiar with and in compliance with the aforementioned specification divisions and sections.
- E. Inclusion of portions of the work under particular divisions of the specifications or sections of the drawings does not in every case conform to the categories of work customarily subcontracted to particular crafts or trades. In such cases, the Contractor shall be responsible to inform bidders, subcontractors, crafts and trades, that work assigned to them is contained in sections other than the usual. In every case, the General Contractor shall be responsible to provide at its cost, all work required in the Contract Documents.
 - 1. Provide project interface and coordination as required to properly and accurately bring together the several parts, components, systems, and assemblies and as required to complete the Work and the Project.
 - 2. Provide interface and coordination of all trades, crafts, and subcontracts as required to provide correct and accurate connection of abutting, adjoining, overlapping, and related Work, and provide all anchors, fasteners, accessories, appurtenances, and incidental items as required to complete the Work properly, fully, and correctly in accordance with the Contract Documents.

3. Provide additional structural components, miscellaneous metal, bracing, blocking, backing, clips, anchors, fasteners, and installation accessories as required to properly anchor, fasten, or attach materials, equipment, appliances, hardware, systems, assemblies, cabinets, and architectural features to the structure.
4. Provide concrete foundations, pads, supports, bases, and grouting for all trades as required for the installation of their Work.
5. Provide equipment, appliances, fixtures, and systems requiring plumbing and mechanical services, rough-in, and connections, or other utilities and services, with such services, rough-in, and final connections.
6. Provide equipment, appliances, fixtures, and systems requiring electrical and cabling services, rough-in, and connections, or other utilities and services, with such services, rough-in, and final connections.
7. Materials, equipment, component parts, accessories, incidental items, connections, and services required to complete the Work which are not provided by subcontractors shall be provided by the Contractor.

3.2 PROJECT COORDINATION AND SCHEDULING CONTROL

- A. The Contractor shall schedule and coordinate the work of all subcontractors on the project including their use of the site. Responsibility for coordination and close adherence to time schedules rests solely with the Contractor who shall maintain coordination and scheduling control at all times.
- B. Each subcontractor responsible to the Contractor shall cooperate diligently with the Contractor in the execution of their work so as to cause no delay in the completion of the Project. This responsibility includes the completion of all work in a timely manner. All Contractors, Prime Contractor and Subcontractors, shall diligently comply with the following requirements:
 1. Cooperate in planning and layout of the work well in advance of operations.
 2. Inform other contractors of requirements at proper time to prevent delay or revisions.
 3. Be informed on the requirements of other contractors and check own work for conflicts with the work of other contractors.
 4. Insure delivery of materials and performance of work on coordinated schedule with other contractors.
 5. Contractor shall ensure subcontractors and equipment suppliers are responsible for compatibility and completeness of the installation and operation of the equipment in their respective Specification Sections including conformance with code requirements.
 6. Attend Pre-Installation meetings identified in Section 013119.

7. Contractor shall be represented on the job site by his superintendent at all times when there is construction going on, including the work of his subcontractors, as well as his own.
- C. Changing Subcontractors: The General Contractor shall be responsible for all the additional expenses incurred by changing subcontractors during the course of this project. These additional expenses include, but are not limited to, A/E expenses for duplicate or redundant submittals, requests for information, or any clarifications or revisions that might occur due to the fact that new subcontractor(s) have assumed responsibility for a portion(s) of the Work.

3.3 MECHANICAL AND ELECTRICAL COORDINATION

- A. Refer to Divisions 20 - 23 for Mechanical Coordination and Divisions 26 - 28 for Electrical Coordination.

3.4 JOB SITE FIELD MEASUREMENTS AND TEMPLATES

- A. Obtain field measurements required for accurate fabrication and installation of Work included in this Contract. Exact measurements are the Contractor's responsibility.
- B. Contractor shall be responsible for field verifying actual dimensions where "+/-" dimensions are indicated, or the words "field verify."
- C. Furnish or obtain templates, patterns, and setting instructions as required for installation of all Work. Verify all dimensions in the field.

3.5 INTENT OF DRAWINGS

- A. The work of the Contractor and subcontractors shall conform to the intent of the architectural and engineering drawings as reviewed by the Architect. Drawings are partly diagrammatic and do not intend to show in details all features of work. The Contractor shall carefully review the work to be performed by other trades, compare related drawings and shall thoroughly understand the building conditions affecting their work.
- B. All changes required in the work caused by failure to do so shall be at no expense to the Owner.

3.6 INTERFERENCES AND RIGHT-OF-WAY

- A. Make proper provisions to avoid interferences. Where conflicts occur, architectural and structural has right-of-way over mechanical and electrical work; concealed mechanical work has right-of-way over concealed electrical work; exposed electrical fixtures have right-of-way over mechanical fixtures.
- B. Submit conflicts which cannot be resolved by right-of-way to the Architect for direction.
- C. Submit reflected ceiling coordination plans showing work by all applicable trades for review and approval by the Architect.

3.7 NOTIFICATION & CORRECTION OF DEFECTIVE WORK

- A. Coordinate the Work of all subcontractors and make certain that, where the work of one trade is dependent upon the work of another trade, the work first installed is properly placed, installed, aligned and finished as specified or required to properly receive subsequent materials applied or attached thereto.
- B. Direct subcontractors to correct defects in substrates they install when subcontractors of subsequent materials have a reasonable and justifiable objection to such surfaces. Promptly notify the Owner's Representative and Architect of any defects or imperfections in preparatory work which will in any way affect satisfactory completion of the work.
- C. Under no condition shall a section of work proceed prior to preparatory work having been completed, cured, dried or otherwise made satisfactory to receive such related work. Do not force subcontractors to apply or install products to improperly finished product.
- D. Correction of defective work shall be the responsibility of the Contractor or subcontractor providing the defective work. Correction of work due to underlying defects shall be the responsibility of the Contractor or subcontractor providing overlying work.

3.8 COORDINATING UTILITIES

- A. Contractor shall be responsible for coordination of and shall cooperate with all utilities to be installed for service to the Project. Utilities may include, but are not limited to, natural gas, telephone, electrical, and cable television. The Contractor shall maintain communication with the utilities in order to coordinate time and requirements of the utilities' installation.
- B. Contractor shall provide all work necessary to comply with the requirements of the Contract Documents for utility work that does not meet the Contract Document requirements, or for work that is disturbed by the utility installation.

3.9 CLOSEOUT COORDINATION

- A. General
 - 1. Coordinate completion and cleanup of work by the various trades in preparation for Substantial Completion.
 - 2. After Owner occupancy of premises, coordinate access to site by the various trades involved for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of Owner's activities.
 - 3. Assemble and coordinate closeout submittals.
- B. At completion of Work of each Subcontract, conduct inspection to assure that:
 - 1. Work is acceptable.

2. Temporary facilities and debris have been removed from site.

C. At Substantial Completion:

1. Conduct inspection and prepare list of work to be completed or corrected.
2. Assist Architect and Owner's Representative in inspection.
3. Supervise correction and completion of Work as established in Architect's inspection reports ("punch lists").
4. Obtain Certificate of Occupancy from governing authorities.

D. At Final Completion: Assist Architect and Owner's Representative in inspection.

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. General Communication.
 - 2. Emergency Communication.
 - 3. Correspondence.
 - 4. Request for Information.
 - 5. Non Compliance Notice.

1.2 GENERAL COMMUNICATION

- A. All telephone and electronic communication and other correspondence shall be between Contractor and Architect, unless otherwise noted below.
- B. Subcontractors are not to contact members of the design team directly unless explicitly agreed to by Contractor, Architect and Owner's Representative. All such contact and discussions are to be documented in writing by the subcontractor and submitted to the Architect and Owner's Representative through the Contractor.
- C. The General Contractor shall transmit problems or questions in writing using a Request for Information (RFI) form.
- D. On-Site Lines of Authority and Communications: Establish on-site lines of authority and communications including attendance at Pre-Construction Meeting and Progress Meetings as required by the Architect and Owner's Representative. All on-site lines of authority and communications shall be established through the Architect.
- E. The Architect and Owner's Representative, will typically be working during the Contractor's normal working hours as defined in Section 011000 - Summary. The Contractor shall anticipate that all communication and weekly construction meetings with these parties will occur between the hours of 8 a.m. and 5 p.m. Monday through Friday throughout the duration of the Project.
- F. No overtime payments will be authorized, or time delays allowed, for the Contractor or subcontractors efforts to communicate with the Architect and Owner's Representative outside of the normal working hours.

1.3 EMERGENCY COMMUNICATION

- A. Provide an Emergency Notification list to the Architect and to the Owner.

1. The Contractor shall provide a list of names, email addresses and numbers of staff who are capable of addressing an emergency issue that may occur outside of Contractor's normal working hours. The persons designated on the list shall be available at the project site within 60 minutes of being contacted. Provide two names for each of the following:
 - a. General Contractor
 - b. Mechanical subcontractor
 - c. Electrical subcontractor
 - d. Other major subcontractors
2. Submit the list to the Architect 5 working days prior to the Preconstruction Meeting. The Architect will include the same information for design team members and Owner representatives and distribute the list at the Preconstruction Meeting.

1.4 CORRESPONDENCE

- A. All correspondence to and from Contractor will be routed through Architect with a copy to the Owner's Representative.
- B. Include project title and Architect's project number on all correspondence.

1.5 REQUEST FOR INFORMATION (RFI)

- A. It is the Contractor's responsibility to review Contract Documents in a timely manner so that the Architect shall have sufficient time to respond to a Request for Information prior to the start of actual construction of that part of the Work.
- B. When field conditions or Contract Document contents require clarification or verification by the Architect or Architect's sub-consultants, a written RFI is to be submitted as follows:
 1. Identify the nature and location of each clarification/verification using a RFI form. Provide as a minimum the following information:
 - a. Project name and number.
 - b. Date.
 - c. Date response desired.
 - d. RFI number.
 - e. Subject.
 - f. Initiator of the question (individual and firm).
 - g. Indication of costs, if known.

- h. Location on site.
 - i. Contract drawing reference.
 - j. Contract specification section and paragraph reference.
 - k. Descriptive text.
 - l. Signature of Contractor.
 - m. Attachments, including descriptive drawings, photographs, product data, submittals, dimensions, configurations, and other information needed to clarify request.
 - n. Space for reply on same page as question.
2. Number each RFI sequentially beginning with number 001 (RFI-001). Only one question per RFI.
- a. Indicate subject by designation of GEN, MECH, ELEC, CIV, or other easily identifiable discipline abbreviation.
 - b. Single subject matter, 1 item each - architectural, civil, structural, mechanical, electrical or general.
3. RFI may be hand-delivered, mailed, e-mailed or faxed, depending upon the urgency.

C. Uses

- 1. The RFI form shall be used for interpretation or clarification of the Contract Documents only.
- 2. Do not use the RFI form for the following. The Architect will not reply and the RFI will be returned without action.
 - a. Product or material substitutions (See Section 012500 - Substitution Procedures).
 - b. Questions relating to construction means, methods, techniques, sequences, procedures, or safety precautions. These are the Contractor's responsibilities exclusively.
 - c. Questions relating to construction schedule, coordination between trades, or division of work among subcontractors. These are Contractor's responsibilities exclusively.
 - d. Questions on contract administration procedural matters, unless they require interpretation or clarifications of the Contract Documents.
 - e. Dimensions or quantities which are shown on the Contract Documents, which can be measured or calculated from the information contained in the Contract Documents where such measurement or calculation is standard construction industry practice.
 - f. Confirmation of interpretations or clarifications previously provided by the Architect.

- g. The Contractor shall not initiate requests for interpretations or clarifications of the Contract Documents which can be reasonably derived from a review of the Contract Documents.
- D. Route RFI's in same manner as correspondence.
- E. Clarifications may be discussed on-site or by telephone with Architect or Architect's Consultants, with concurrence of the Architect. A summary of these discussions is to be incorporated into a RFI form and submitted as written confirmation, for normal RFI processing.
- F. Reply
 - 1. The Architect will endeavor to reply to all RFI's as promptly as his work schedule allows, and generally no later than 7 working days from the day received. The Architect and/or its sub-consultants will attempt to expedite those RFI's indicated by the Contractor as being critical to the construction schedule.
 - 2. When an RFI involves a complex subject, extensive research or governmental agency contact, the Architect will inform the Contractor that additional time is required to prepare a reply. The Contractor shall cooperate and agree to reasonable additional time.
 - 3. The reply shall be a clarification or an interpretation of the Contract Documents; the reply is not an authorization of change in the Contract Sum or Time.
 - 4. Where Architect's action may affect Contract Time or Contract Sum:
 - a. Notify Architect in writing within 10 days of receipt.
 - b. Conform to Conditions of the Contract for submittal of Change Order Proposal, Section 012600 - Contract Modification Procedures.
- G. On receipt of Architect response to RFI:
 - 1. Update RFI log and promptly distribute RFI response to those affected by response.
 - 2. Review and notify Architect within 7 days if Contractor disagrees with response.
- H. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by RFI number. Submit log weekly. Include following:
 - 1. Project Name.
 - 2. Name and address of Contractor.
 - 3. Name and address of Architect.
 - 4. RFI number including those that were dropped and not submitted.
 - 5. RFI description.

6. Date RFI was submitted.
 7. Date Architect's response was received.
 8. Identification of related Minor Changes in the Work, Architect's Supplemental Instructions (ASI), Construction Change Directives (CCD), and Proposal Requests, as applicable.
- I. Note: Architect will respond only to requests for interpretation of Contract Documents originating from Contractor. The Contractor shall be deemed to be the author of all RFI's, whether written by him or one of his sub-contractors or suppliers. It is the Contractor's responsibility to ensure that all RFI's are complete and correct in form, and the Contractor shall be the contact for further information or explanation. All replies shall be directed to the Contractor, and it is his responsibility to ensure that the appropriate contractor personnel are copied or informed of the replies.

1.6 NON-COMPLIANCE NOTICE (NCN)

- A. Any work that is identified as "not in compliance" with the Contract Documents, either by oral discussion with the Contractor, or written communication to the Contractor, shall be removed and replaced without cost to the Owner, including removal of additional material necessary to confirm non-compliance. At its option, the Owner may accept written alternative solutions offered by the Contractor and recommended by the Architect. The Contractor shall notify the Architect and Owner in writing immediately following oral discussion or receipt of any written communication if the Contractor believes that the Work in question is in compliance with the Contract Documents. The Architect will make a determination based on the Contract Documents. If the Architect finds the work is in noncompliance, the Architect will issue a written Non-Compliance Notice (NCN). Such notice, when delivered to the Contractor at the work site, shall be deemed sufficient for the purpose of notification. Upon receipt of the NCN, the Contractor shall take immediate action to correct work. Review corrections at progress meetings for closure.
- B. If the Contractor fails to or refuses to comply promptly after the final determination of the appropriate corrective action, the Owner may:
1. Issue an order stopping all or part of the work until satisfactory corrective action has been taken. The Owner will not pay for non-complying work or follow on work until the non-complying work is corrected or replaced. If it becomes necessary to stop work due to non-correction of non-complying work, no delay claim, time extension, or compensation will be granted.
 2. Elect to correct the non-compliant work with his own forces, or those of another contractor, and back charge the Contractor by issuing a deductive Change Order, with appropriate explanation and supporting data, which the Contractor is required to sign. Should the Contractor elect not to sign the deductive Change Order, he will be deemed to be in breach of the contract and the dispute will be subject to the Dispute Resolution Procedures of the General Conditions.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

- A. This Section specifies administrative and procedural requirements for project meetings, including, but not limited to, the following:
 - 1. Preconstruction meeting.
 - 2. Progress meetings.
 - 3. Coordination meetings.
 - 4. Pre-installation meetings.
 - 5. Project closeout meetings.
 - 6. Owner training meetings.

1.2 PRECONSTRUCTION MEETING

- A. The Owner will schedule a preconstruction conference before starting construction, at a time convenient to the Contractor and the Architect, but no later than 15 days after the Notice to Proceed. The conference will be held at the Project Site or another convenient location as selected by Owner.
- B. Attendance is required of the following:
 - 1. Architect and Architect's consultants.
 - 2. Owner's Representatives.
 - 3. Contractor's Superintendent and Project Manager; Contractor's QC Representative if different individual than the Project Manager.
 - 4. Major Subcontractors.
 - 5. Others, as requested.
- C. Discussion will cover items of significance, including the following:
 - 1. Communication chain and persons authorized to direct changes.
 - 2. Submission of executed bonds and insurance certificates.
 - 3. Submission of list of Subcontractors and preliminary progress schedule per Section 013216 - Construction Progress Schedule.
 - 4. The Work.
 - 5. Construction Team roles.

6. Work hours, sequence, phasing, and occupancy.
7. Special project procedures.
8. Procedures and processing for Application for Payments; Change Orders (CO);
9. Requests for Information (RFI); Architect Supplemental Instructions (ASI); Field decisions; Submittals; and others as appropriate.
10. Project record documents including review of as-builts on a regular basis during construction.
11. Construction facilities, and controls.
12. Temporary utilities.
13. Safety and security procedures.
14. Environmental and noise controls.
15. Housekeeping and site maintenance procedures.
16. Utility shutdowns / Outage Request Form.
17. Site Access and Parking.
18. Equipment deliveries and priorities.
19. Testing Procedures.
20. Scheduling Progress Meetings.
21. Schedule Review.
22. Contractor's Quality Control Program
23. Hazardous material abatement procedures, if any.
24. Waste Management Plan
25. IAQ Plan.
26. Use of site and premises by Owner and Contractor.
27. Requirements for start-up of equipment.
28. Inspection and acceptance of equipment put into service during construction period.
29. Others, as appropriate.

D. The Architect will:

1. Conduct the meeting to review contract administration requirements.
 2. Record, produce, and distribute copies of the minutes to the Owner and General Contractor within seven (7) days of the meeting.
- E. The Contractor will:
1. The General Contractor shall be responsible to distribute copies to all other Contractor attendees.

1.3 PROGRESS MEETINGS

- A. For purposes of coordination and scheduling after start of the work, weekly Progress Meetings will be held to enable an orderly review of the construction progress and to provide for systematic discussion and analysis of concerns that may arise relative to execution of the work.
- B. Contractor, and Subcontractors as required, shall incorporate attendance at these meetings as part of the Base Bid of the project – no overtime payments will be authorized for Contractor or Subcontractors to attend weekly Progress Meetings or other special meetings if required.
- C. Meeting Locations: ADA accessible Contractor's project field office or Owner provided meeting room, unless otherwise agreed.
- D. Attendance: Representatives attending meetings are required to be qualified and authorized to act on behalf of their firms. Attendance shall include:
 1. Architect and Architect's consultants, as appropriate.
 2. Owner's Representatives.
 3. Contractor's Superintendent, Project Manager, and QC Representative.
 4. Subcontractors, as appropriate.
 5. Suppliers, as appropriate.
 6. Others, as appropriate.
- E. Agenda: Discussion will pertain to items, such as:
 1. Attendees; list of attendees and company they represent.
 2. Review and approve minutes of previous meeting; written corrections, additions and/or deletions to previous minutes acknowledged.
 3. Review of Work in Progress: Discussion and field review.
 4. Review Short Interval Schedule.
 5. Review Outages.

6. Review construction schedule.
7. Present corrective measures and procedures to regain project schedule, as applicable.
8. Present field observations, problems, and conflicts; discuss concerns pertaining to:
 - a. Mechanical items.
 - b. Electrical items.
 - c. Architectural items.
9. Discuss problems impeding progress schedule.
10. Planned progress during succeeding work period.
11. Review Contractor's quality control system; discuss any concerns and corrective measures.
12. Review submittal schedules and logs, present methods to expedite as required.
13. Review off-site fabrication.
14. Review delivery schedules.
15. Review outstanding RFIs.
16. Review proposed changes for:
 - a. Effect on construction schedule and on completion date.
 - b. Effect on any other contracts of the project.
17. Review Change Order Proposal log and finalize prices.
18. Review draft of Application for Payment (at end of month).
19. Confirm status of the "as-built" drawings and review required revisions to Project Record Documents; see update requirements specified below.
20. Confirm status of shop drawing submittals and approvals.
21. Review project safety.
22. Review Waste Management Plan.
23. Review any outstanding Non-Compliance Notices.
24. Review any other business.
25. Confirm next meeting date, location and time plus those requested to be in attendance.

- F. Architect will:
 - 1. Administer Progress Meetings throughout work progress;
 - 2. Record and distribute the following by e-mail within 3 working days after the meeting: Meeting Minutes, RFI, ASI, Submittal/Shop Drawing and Cost Change logs. Distribution to include all attendees other than those related to the General Contractor's contract. The General Contractor is responsible to distribute copies to all Contractor attendees.
 - 3. Provide paper copies of the minutes, RFI, ASI, Submittal/Shop Drawing and Cost Change logs to attendees at the next meeting.
 - 4. Ascertain that work is prosecuted consistently with contract documents and construction schedules.
- G. At Contractor's option, weekly progress meetings can be held integrally with monthly CPM Scheduling meeting specified herein.
- H. Contractor shall be responsible to provide the following at each meeting:
 - 1. Current (and updated if necessary) Short Interval Schedule as specified in Section 013216 - Construction Progress Schedule.
 - 2. Current (and updated if necessary) submittal schedule.

1.4 COORDINATION MEETINGS

- A. Contractor shall hold weekly coordination meetings with his subcontractors and suppliers as deemed necessary by the Contractor for coordination of the work. Meetings shall be held on site. The Owner and the Architect will be available to attend such meetings upon request. Refer to Section 013100 - Project Management and Coordination for additional information and requirements pertaining to coordination meetings.
- B. The superintendent of the Contractor and prime subcontractors shall review the Contractor's schedule for the first three (3) months of work and thoroughly review the work required by the Contract Documents for that period. The Contractor shall submit Design Clarification Requests, Requests for Information, or any other type of information requests the Contractor may use, for the three (3) month work period during the first month after Notice To Proceed to minimize any conflicts that might occur when mobilization begins.
 - 1. This process shall continue for each three (3) months, or increments of 3 month work segments until the completion of the Project.
- C. Project coordination meetings are in addition to specific meetings held for other purposes, such as regular progress meetings and special pre-installation meetings.
- D. Request representation at each meeting by every trade currently involved in coordination or planning for the construction activities involved.

- E. Record meeting results and distribute copies to Architect and Owner and to others affected by decisions or actions resulting from each meeting.

1.5 PRE-INSTALLATION MEETINGS

- A. General: Prior to commencement of work listed below or as otherwise determined by the Architect or Owner, the General Contractor or his general superintendent, the responsible foremen for the subcontractors performing said work, plus all associated sub-subcontractors, suppliers, fabricators, vendors, and others as appropriate, shall attend a meeting for the purpose of establishing a full understanding of the procedures and requirements for the orderly progress of the designated work.
- B. All subcontractors and major suppliers are required to attend these pre-installation meetings prior to commencing work of their respective specifications Section, or as required by related work in other specification sections. Contractor may elect to group several Sections or Divisions to minimize the number of these meetings.
- C. Require attendance of entities directly affecting, or affected by, work of the Section including Contractor's Project Manager and Superintendent with Lead man performing the work, and/or the appropriate Subcontractors/Suppliers/Fabricators.
- D. Contractor shall notify the Architect and Owner of the Contractor's scheduled pre-installation meeting not less than seven (7) days prior to the scheduled start of any of the work listed below so that the Architect and Owner may attend at their option. All applicable submittals as well as the Subcontractor's safety plan and insurance certificates shall have been submitted to and reviewed by the Architect and Owner prior to scheduling this meeting. Refer to individual technical sections for work requiring pre-installation meetings.
- E. Contractor will record, reproduce and distribute copies of minutes prior to the next meeting or within seven (7) days of each meeting to all meeting participants.

1.6 PROJECT CLOSEOUT MEETINGS

- A. For the purpose of attaining project closeout, commencing immediately following established date of Substantial Completion, Contractor's project manager and superintendent and all subcontractors who have outstanding punch list items associated with their work, or as otherwise requested and including all subcontractors involved in the building systems commissioning process, shall attend weekly closeout meetings which shall be held at the jobsite.
- B. Such meetings shall be held to review and discuss the resolution of all punch list items in order to attain Final Completion. Closeout meetings shall continue on a weekly basis until all punch list items have been resolved and Final Completion is attained.

1.7 TRAINING MEETINGS FOR OPERATING INSTRUCTIONS OF OWNER'S PERSONNEL

- A. Refer to Section 017700 for training requirements related to operating instructions of Owner's personnel.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Submittals.
- B. Quality assurance.
- C. Bar chart schedules.
- D. Review and evaluation.
- E. Updating schedules.
- F. Distribution.

1.2 DEFINITIONS

- A. "Day," as used throughout the Contract unless otherwise stated, means "calendar day."
- B. Float: The amount of time between the earliest finish and the latest finish date of an activity or chain of activities on the Critical Path Method (CPM) construction schedule. Float is not for the exclusive use of either the Contractor or the Owner unless otherwise identified in the Contract Documents.
Extensions of time for Contract performance will be granted only to the extent that equitable time adjustments to the affected activity or activities exceed the total float time along the affected paths of the currently approved CPM at the time Notice to Proceed was issued for the change.

1.3 SUBMITTALS

- A. All schedule submittals, including schedule updates, will be reviewed jointly by the Owner/Architect and the Contractor. Such review of the Contractor's schedules shall not constitute an approval or acceptance of the Contractor's construction means, methods, or sequencing or its ability to complete the Work in a timely manner. Neither the Owner's nor the Architect's review will relieve the Contractor of the sole responsibility for the accuracy, adequacy, or completeness of the schedule, the logic of the schedule, and/or completion of the Contract requirements in accord with such schedule. Neither Owner's nor Architect's review shall constitute acknowledgment that the relationships between various work items or activity durations are reasonable or appropriate.
- B. Within 10 days after date of Notice to Proceed, submit proposed preliminary diagram defining planned operations for first 60 days of Work, with general outline for remainder of Work.
- C. Participate in review of preliminary and complete diagrams jointly with Architect/Engineer.
- D. Submit updated schedules with each Application for Payment.
- E. Submit schedules under transmittal letter form specified in Section 013300 - Submittal Procedures. PDF method preferred.

F. Schedule Updates:

1. Overall percent complete, projected and actual.
2. Completion progress by listed activity and sub-activity, to within five working days prior to submittal.
3. Changes in Work scope and activities modified since submittal.
4. Delays in submittals or resubmittals, deliveries, or Work.
5. Adjusted or modified sequences of Work.
6. Other identifiable changes.
7. Revised projections of progress and completion.

G. Narrative Progress Report:

1. Submit with each monthly submission of Progress Schedule.
2. Summary of Work completed during the past period between reports.
3. Work planned during the next period.
4. Explanation of differences between summary of Work completed and Work planned in previously submitted report.
5. Current and anticipated delaying factors and estimated impact on other activities and completion milestones.
6. Corrective action taken or proposed.

1.4 QUALITY ASSURANCE

- A. Scheduler: Contractor's personnel specializing in CPM scheduling with two years' minimum experience in scheduling construction work of complexity comparable to the Project and having use of computer facilities capable of delivering detailed graphic printout within 48 hours of request.
- B. Coordination with Subcontractors and Suppliers:
1. The scheduler shall prepare the Project Schedules and their updates in cooperation with major subcontractors and suppliers.
 2. In scheduling work of subcontractors and deliveries by suppliers, the Contractor represents that he has agreement regarding the schedule with those supplying materials and performing the work.
- C. Reliance Upon the Reviewed Schedule:

1. The Progress Schedule, as reviewed by the Architect, will be an integral part of the Contract and will establish interim completion dates for the various activities under the Contract.
2. Should any activity on the critical path not be completed within 15 calendar days after the stated scheduled date, the Owner shall have the right to require the Contractor to expedite completion of the activity by whatever means appropriate and necessary, without additional compensation to the Contractor. In addition, Contractor shall submit a "Recovery Schedule" which shall logically demonstrate method or methods Contractor proposes to get back on schedule within thirty (30) days of said date; i.e., additional tradespersons, shifts, work days, or crews.
3. In addition to above, should any activity be 15 days or more behind schedule, the Owner shall have the right to perform the activity or have the activity performed by whatever method the Owner deems appropriate.
4. Costs incurred by the Owner and the Architect in connection with expediting construction activity under this Article shall be the responsibility of the Contractor.
5. It is expressly understood and agreed that failure by the Owner to exercise the option either to order the Contractor to expedite an activity or to expedite the activity by other means shall not be considered to set a precedent for any other activities.

1.5 BAR CHART SCHEDULES

A. Format (Microsoft Project or approved software): Bar chart Schedule, to include at least:

1. Identification and listing in chronological order of those activities reasonably required to complete the Work, including:
 - a. Subcontract Work.
 - b. Major equipment design, fabrication, factory testing, and delivery dates including required lead times.
 - c. Preconstruction conferences.
 - d. Move-in and other preliminary activities.
 - e. Equipment and equipment system test and startup activities.
 - f. Project closeout and cleanup.
 - g. Work sequences, constraints, and milestones.
2. Listings identified by Specification Section number.
3. Identification of the following:
 - a. Horizontal time frame by year, month, and week.

- b. Duration, early start, and completion for each activity and subactivity.
- c. Critical activities and Project float.
- d. Subschedules to further define critical portions of Work.

1.6 REVIEW AND EVALUATION

- A. Baseline Schedule: The initial Schedule when reviewed by the Architect and Owner shall be identified as the Baseline Schedule and shall be known as Revision 0. Each subsequent reviewed change to the Schedule shall be as a Revision numbered in sequence (Revision 1, 2, 3, etc.). The Baseline Schedule shall be submitted with no progress percentages applied to activities. The first update shall include the preliminary schedule activities and remaining activities updated as of the second monthly pay request.
- B. Participate in joint review and evaluation of schedules with Architect/Engineer at each submittal.
- C. Evaluate Project status to determine Work behind schedule and Work ahead of schedule.
- D. After review, revise schedules incorporating results of review and resubmit within 10 days.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 PRELIMINARY CONSTRUCTION SCHEDULE

- A. Scope of Preliminary Construction Schedule: The Preliminary Progress Schedule shall detail, at a minimum, all work which will be accomplished in the first 60 calendar days following the Notice to Proceed. The general approach of the balance of the work shall be indicated.
- B. Limitation on Construction:
 - 1. Mobilization and submittals can be in process during the review period.
 - 2. No construction work shall be permitted until the Preliminary Construction Schedule is submitted and reviewed.
- C. Initial Progress Payment: The first pay request will be based on the update of the preliminary schedule. This submittal shall be in the form of three (3) copies of a computer plotted timescaled logic diagram, the accompanying Microsoft Project CD, and hard copy computer reports sorted by activity number, early start and total float.

3.2 COMPLETE CONSTRUCTION SCHEDULE

- A. Progress Payments:
 - 1. Shall be withheld in the absence of a reviewed Construction Schedule.

2. No adjustment or extension of time shall be granted for failure to meet the activity dates as shown. Failure to comply with these requirements shall be cause for rejection of any progress payments presented thereafter, until such time as these requirements are met.

3.3 DISTRIBUTION

- A. Copies of reviewed preliminary Construction Schedule and every reviewed revision thereof shall be submitted to the project web site for review by the: Architect, Owner and everyone whose time performance is essential to achieving the progress shown on the schedule. Notification of these updates shall be emailed to all participants with directions to access web site.

3.4 SHORT INTERVAL SCHEDULE

- A. Prepare a 3-week Short Interval ("look-ahead") Schedule for each progress meeting. Show one (1) prior week of actual progress (planned vs actual performance). Forecast two (2) weeks of start and completion dates for each activity, task or event in comparison to the prepared schedule.
 1. Activities in the Short Interval Schedule shall relate directly to activities in the Construction Schedule. Each activity shall be coded with the same ID number, specification number, or other reference the contractor uses on the Construction Schedule. The Short Interval Schedule will have more detail, but each of the details must be related to the Construction Schedule coding.
 2. Indicate start, on-going, intermittent and completion for each activity, task, or event.
 3. The schedule shall show critical path work, as defined by the Construction Schedule that has been affected by any changed conditions authorized through a change order or field order.
- B. Distribute paper copies of the Short Interval Schedule to all attendees at each Progress Meeting.

3.5 UPDATES

- A. General:
 1. The scheduler shall attend all meetings concerning project progress, alleged delays, or time impact.
 2. The schedule shall be modified to reflect the original Contract completion date, subject to review by the Owner. Prior to submittal of the schedule update, the Contractor shall submit an advanced worksheet indicating the intended report status. The Owner, Architect and Contractor shall then meet and agree upon the completion status of the work in progress, and any major logic changes proposed by the Contractor.
 3. Maintain the Construction Schedule at the project meeting location and update weekly by drawing a line vertically through the corresponding progress of each task on the schedule as of the date of that project meeting. The line shall be in varying colors so that differentiation between weeks is readily apparent.

B. Progress Meetings:

1. Update the reviewed Construction Schedule at each Progress Meeting.
2. Indicate "actual" progress in percent complete for each activity.
3. At each progress meeting discuss the Short Interval Schedule. Any deviation from the planned schedule shall be explained by Contractor, with corrective measures, if necessary, to bring progress of Work back in line with the Contract Completion date.

C. Monthly Update:

1. Contractor shall submit an updated schedule at progress meeting following either one of the following two occurrences:
 - a. Upon completion of a major milestone; or,
 - b. When the actual work completed is more than two (2) weeks behind schedule. Should the schedule show the project completion to be more than two weeks behind, the Contractor shall submit a written explanation and recovery schedule outlining corrective action taken or proposed to bring events back on schedule within a 30 day period.
2. Show changes occurring since previous schedule submission, such as:
 - a. Any major changes in scope, including authorized or Change Orders;
 - b. Contractor reorganization of his work sequence unrelated to changes in scope;
 - c. Activities modified since previous submission;
 - d. Revised projections for progress and completion, as applicable; and
 - e. Any other identifiable changes.
3. Provide narrative report as needed to define:
 - a. Problem areas, anticipated delay, and impact of these on schedule; and
 - b. Corrective action recommended and its effect.

D. Subcontractor Participation:

1. Involve all major subcontractors in preparation of the Periodic Updates of the Construction Schedule.
2. Obtain approval of the schedule from each major subcontractor and submit in writing together with the Periodic Updates of the Construction Schedule.

E. Change Orders:

1. Authorized changes to the work shall be included in the schedule network as they occur in the same format and level of detail as contained in the current updated schedule. Enough activities shall be included to adequately describe the work. Code the activities in such a way that they can be identified to the specific Change Order. Insert the Change Order Activities in the network with appropriate logic ties to original network activities.
2. Utilize the time impact analysis submitted with the change order to demonstrate the effect of delays on the overall project schedule.

3.6 TIME EXTENSIONS

- A. The Contractor shall notify the Owner and Architect in writing within seven (7) days of the event of any event which could delay performance or supplying of any item of the work affecting the critical path. Contractor shall indicate the expected duration of the delay, the anticipated effect of the delay on the Contractor's Construction Schedule, and the action being taken to correct the delay situation.
- B. Extensions of time to the Contractor's Contract may be granted only for delays to activities on the critical path that actually delay the Project Completion beyond the date of Substantial Completion, or for delays to activities that transform that activity onto the critical path, and as a result cause a final completion date beyond the contracted final completion date.
- C. Following receipt of an executed Change Order extending the Contract Time, the activity data and logic relationships shall be incorporated into the current detailed CPM schedule during the next scheduled progress update, as outlined above in Paragraph E "Change Orders" above. In the event the Contractor is entitled to a change in the Contract Time, the adjustment to the contract Time shall be as defined in the General Conditions.

3.7 ABNORMAL INCLEMENT WEATHER

- A. Abnormal Inclement Weather or Unusually Severe Weather: Weather which hinders or prevents work is not a basis for a time extension unless it surpasses in severity the weather reasonably to be expected in the locality at the particular time of year. If a timely notice is filed that a delay was caused by weather sufficiently severe as to entitle additional time, the Contractor is to furnish as promptly as possible thereafter a statement of the portions of the work affected, an explanation as to the reasons work was prevented or hindered by the weather if not readily apparent, the dates on which such portions of work were affected, the total number of days by which the job in its entirety was delayed and any other information which would be of assistance to support the time extension claim such as official weather bureau climatological (www.weather.gov) data for several prior years.
- B. Except for site work which may critically affect the Contract Time, no extension of time will be made for abnormal inclement weather after the principle portions of the Work are sufficiently closed-in (exterior walls up and roof in place) so as to permit any structure, or major portion thereof which is part of the Work, to be adequately heated so as to allow the various trades to perform their work.

- C. If the total calendar days lost due to abnormal inclement weather, from the start of the Work at the Project site by the Contractor until the principle portions of the Work are enclosed, exceeds the total number of days to be expected for the same period, a time extension, if granted, shall only be the number of calendar days needed to equal the excess number of calendar days lost due to such abnormal inclement weather.

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. This Section includes administrative and procedural requirements for submittals required for performance of the Work, including the following
 - 1. Submittal procedures.
 - 2. Construction progress schedules.
 - 3. Proposed product list.
 - 4. Product data.
 - 5. Use of electronic CAD files of Project Drawings.
 - 6. Shop Drawings.
 - 7. Samples.
 - 8. Other submittals.
 - 9. Test reports.
 - 10. Certificates.
 - 11. Manufacturer's instructions.
 - 12. Manufacturer's field reports.
 - 13. Construction photographs.
 - 14. Special job-site submittals
- B. Contractor review.
- C. Architect/Engineer review.
- D. Consent for release of electronic media.

1.2 SUBMITTAL PROCEDURES

- A. Before submittal of shop drawings, brochures, and lists, Contractor shall carefully review same for proper identification, completeness, correctness, dimensions, and technical applicability to the Contract Document requirements and note all corrections, items needing clarification, additional comments, and the like. Upon thorough review and subsequent acceptance by the Contractor, if so accepted, Contractor is to note its approval together with said notes or amendments thereto for compliance with the Contract Documents by suitable stamp, date and the signature of the Contractor or its authorized representative. Submittals will be returned to the Contractor without action by the Architect if the items submitted are not stamped, signed, and identified as approved or approved as noted or other similar language indicating approval by the Contractor, or if the submittal is obviously not thoroughly reviewed.
- B. Submission of shop drawings and samples shall be accompanied by a transmittal letter containing Project name, Contractor's name, number of drawings and samples, titles and other pertinent data.
- C. Many products are specified by one or more named products/manufacturers. In those circumstances where Contractor submits an unnamed, non-prior approved product/manufacturer during this 'shop drawing' phase, said submittal shall be submitted in conformance with Section 012500 - Substitution Procedures.
- D. Coordinate preparation and processing of submittals with performance of construction activities. Transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay.
 - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 - 2. Coordinate transmittal of different types of submittals for related elements of the Work so processing will not be delayed by the need to review submittals concurrently for coordination.
 - a. The Contractor shall provide submittals requiring coordination with other submittals to the Architect at one time. The Architect will review submittals as received, provide comments, and return them to the Contractor. If the Contractor did not submit all submittals requiring coordination at the same time, and a later submittal identifies conflicts, the Contractor will be responsible for all costs associated with changes necessary to properly coordinate the installation of the materials.
 - 3. To avoid the need to delay installation as a result of the time required to process submittals, the Contractor shall anticipate the review times noted in this section and anticipate the possibility of a resubmittal or rejected submittal and the effect that action would have on the Project schedule.

- a. All required submittals shall be initially received by the Architect within 60 days following the Notice to Proceed date, or sooner as required by the following submittal review times, to meet the Construction Schedule need for materials related to the submittals. Submittals received after these time periods shall not be a cause for delay claims to the Project. Architect will not accelerate review time for submittals received after the indicated time periods, regardless of any potential impact to the Contractor's schedule.
 - b. Submittals requiring color selection and material selection are interdependent on receiving all submittals at the same time that have such selection requirements. Allow 20 working days from the date of receipt of the last such submittal by the Contractor for the Architect to complete color selections and mail out from the Architect's office.
 - c. Allow additional 5 working days for submittals requiring Architect consultant review.
 - d. For all other submittals allow 10 working days, after receipt by the Architect, to complete the initial review and mail out from the Architect's office.
 - e. If the Architect must delay processing a submittal to permit coordination with subsequent submittals, the 10 working days will begin upon receipt of the last such coordination submittal from the Contractor.
 - f. If several submittals are provided by the Contractor at the same time, allow 20 working days after receipt by the Architect to complete the initial review and respond. Provide an "Order of Priority List" to the Architect with the submittal.
 - g. If an intermediate submittal is necessary, process the same as the initial submittal.
 - h. Allow 10 working days for reprocessing each submittal after receipt unless noted otherwise.
- E. Place a permanent label or title block on each submittal for identification. Indicate the name of the entity that prepared each submittal on the label or title block. Consecutively number each submittal beginning with the number 001.
- 1. Provide adequate space for the Contractor's stamp and approval, plus a space approximately 4 by 5 inches each on the label or beside the title block on Shop Drawings to record the Architect's review and approval markings and the action taken.
 - 2. Include the following information on the label or title block for processing and recording action taken.
 - a. Project name and job number.
 - b. Date.
 - c. Name and address of the Architect.

- d. Name and address of the Contractor, subcontractor, supplier and manufacturer as appropriate.
 - e. Number and title of appropriate Specification Section.
 - f. Drawing number and detail references, as appropriate.
- F. Package each submittal appropriately for transmittal and handling. Transmit each submittal from the Contractor to the Architect using a transmittal form. Submittals received from sources other than the Contractor will be returned through the Contractor without action. Submittals not requested will be returned unprocessed.
- 1. Address no more than one topic or related topics on a single transmittal (i.e. mechanical items shall not be submitted under same transmittal with electrical items, even though the same Contractor/subcontractor may be responsible for both).
 - 2. Record relevant information, deviations, and requests for data, including minor variations and limitations from the Contract Documents.
 - 3. Shop drawings, product data, samples, and mock-up as required for submissions by the technical specification sections are to be submitted for Architect's review/approval until "No Exception Taken" or "Make Corrections Noted" is obtained. The number of submittals required is noted in parenthesis.
 - a. Shop Drawings: (2) sets; plus one (1) additional set for Structural, Mechanical and Electrical submittals. Or one PDF if transmitted electronically (PDF method preferred).
 - b. Product Data: (2) copies; plus one (1) additional copy for Structural, Mechanical and Electrical submittals. Or one PDF if transmitted electronically (PDF method preferred).
 - c. Samples: (3) each.
 - d. Mock-ups: As required by any technical specification section.
 - e. Reference applicable mechanical and electrical technical specifications' sections for additional submittal requirements.
 - 4. Material and Color Submittal: Submit samples of actual colors of materials.
 - 5. Number submittals as follows: Numerical Order, Spec Section and Revision.
 - 6. In the event of the need to "Revise and Resubmit" a submittal, resubmit same in acceptable form/content, clearly identifying deviations from previous submittal content.
- G. Do not transmit submittals directly to Architect's consultants. Architect will review and transmit submittals to consultants for their review.
- H. Prior to submitting transmittals required by Building Code to building code officials and other Authorities Having Jurisdiction (AHJ), transmit submittals to Architect for review and approval.

- I. Maintain copy in project Field Office of each submittal, regardless of status, along with a current Submittal Log,

1.3 CONSTRUCTION PROGRESS SCHEDULE SUBMITTALS

- A. Comply with Section 013216 - Construction Progress Schedule

1.4 PROPOSED PRODUCT LIST

- A. Within 15 days after date of Notice to Proceed, submit list of major products proposed for use, with name of manufacturer, trade name and model number of each product.
- B. For products specified only by reference standards, indicate manufacturer, trade name, model or catalog designation and reference standards.

1.5 PRODUCT DATA

- A. Product Data: Submit to Architect/Engineer for review for assessing conformance with information given and design concept expressed in Contract Documents.
- B. Submit electronic submittals via email as PDF electronic files.
- C. Mark each copy to identify applicable products, models, options and other data. Supplement manufacturers' standard data to provide information specific to this Project.
- D. Indicate product utility and electrical characteristics, utility connection requirements and location of utility outlets for service for functional equipment and appliances.
- E. After review, distribute according to "Submittal Procedures" Article and for record documents described in Section 017000 - Execution.

1.6 ELECTRONIC CAD FILES OF PROJECT DRAWINGS

- A. Electronic CAD Files of Project Drawings: May only be used to expedite production of Shop Drawings for the Project. Use for other Projects or purposes is not allowed.
- B. Electronic CAD Files of Project Drawings: Distributed only under the following conditions:
 1. Use of files is solely at receiver's risk. Architect/Engineer does not warrant accuracy of files. Receiving files in electronic form does not relieve receiver of responsibilities for measurements, dimensions and quantities set forth in Contract Documents. In the event of ambiguity, discrepancy or conflict between information on electronic media and that in Contract Documents, notify Architect/Engineer of discrepancy and use information in hard-copy Drawings and Specifications.
 2. CAD files do not necessarily represent the latest Contract Documents, existing conditions, and as-built conditions. Receiver is responsible for determining and complying with these conditions and for incorporating addenda and modifications.

3. User is responsible for removing information not normally provided on Shop Drawings and removing references to Contract Documents. Shop Drawings submitted with information associated with other trades or with references to Contract Documents will not be reviewed and will be immediately returned.
4. Receiver shall not hold Architect/Engineer responsible for data or file clean-up required to make files usable, nor for error or malfunction in translation, interpretation or use of this electronic information.
5. Receiver shall understand that even though Architect/Engineer has computer virus scanning software to detect presence of computer viruses, there is no guarantee that computer viruses are not present in files or in electronic media.
6. Receiver shall not hold Architect/Engineer responsible for such viruses or their consequences and shall hold Architect/Engineer harmless against costs, losses or damage caused by presence of computer virus in files or media.
7. The Contractor is to obtain a Consent for Release of Electronic Media per attached form (an electronic version of this form is available upon request). Subcontractors are to obtain this information from the Contractor and their use of the electronic files is subject to the same conditions.

1.7 SHOP DRAWINGS

- A. Shop Drawings: Submit to Architect/Engineer for assessing conformance with information given and design concept expressed in Contract Documents.
- B. Submit drawings drawn to accurate scale. Shop drawings are not intended to change the design. Do not reproduce Contract documents or copy standard information for use as Shop Drawings. Standard information prepared without specific references to the project is not a Shop Drawing.
- C. Provide fabrication and installation drawings, setting diagrams, schedules, patterns, templates, and similar drawings. Include the following information:
 1. Dimensions.
 2. Identification of products and materials included.
 3. Compliance with specified standards.
 4. Notation of coordination requirements.
 5. Notation of dimensions established by field measurements.
 6. Any deviation from contract drawings or specifications.
 7. Date when review has to be finalized to meet schedule.

- D. Indicate special utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
- E. When required by individual Specification Sections, provide Shop Drawings signed and sealed by a professional Engineer responsible for designing components shown on Shop Drawings.
 - 1. Include signed and sealed calculations to support design.
 - 2. Submit Shop Drawings and calculations in form suitable for submission to and approval by authorities having jurisdiction.
 - 3. Make revisions and provide additional information when required by authorities having jurisdiction.
- F. All items shown on shop drawings that do not conform to plans and specifications shall be specifically noted as such (flagged) and brought to the Architect's attention. In any case, the Architect's stamp of review shall not include approval of unauthorized changes in the Contract Documents, except where specific written approval is given.
- G. Contractor is responsible for obtaining and distributing required shop drawings to its subcontractors and material suppliers after, as well as before, final review by the Architect. Prints or PDF's of reviewed shop drawings shall be made from approved submittals which carry the Contractor's and Architect's appropriate stamps. Architect/Owner and applicable consultants and AHJ shall retain copies of each shop drawing submittal.
- H. Submit electronic submittals via email as PDF electronic files.

1.8 SAMPLES

- A. Samples: Submit to Architect/Engineer for assessing conformance with information given and design concept expressed in Contract Documents.
- B. Samples for Selection as Specified in Product Sections:
 - 1. Submit to Architect/Engineer for aesthetic, color and finish selection.
 - 2. Submit Samples of finishes, textures and patterns for Architect/Engineer selection.
- C. Submit Samples to illustrate functional and aesthetic characteristics of products, with integral parts and attachment devices. Coordinate Sample submittals for interfacing work.
 - 1. Where variation in color, pattern, texture or other characteristics are inherent in the material, submit not less than four (4) units to show approximate limits of the variations.
- D. Include identification on each Sample, with full Project information.
- E. Submit number of samples specified in individual Specification Sections; Architect/Engineer may retain one sample.

- F. Reviewed Samples, which may be used in the Work, are indicated in individual Specification Sections.
- G. Samples will not be used for testing purposes unless specifically stated in Specification Section.
- H. Unless noted otherwise in the relevant technical section of these specifications, remove all samples and mock-ups from the project site, after review and approval by the Owner and Architect.

1.9 OTHER SUBMITTALS

- A. Closeout Submittals: Comply with Section 017700 - Closeout Procedures.

1.10 TEST REPORTS

- A. Informational Submittal: Submit reports for Architect/Engineer's knowledge as Contract administrator or for Owner.
- B. Submit test reports for information for assessing conformance with information given and design concept expressed in Contract Documents.

1.11 CERTIFICATES

- A. Informational Submittal: Submit certification by manufacturer, installation/application Subcontractor, or Contractor to Architect/Engineer, in quantities specified for Product Data.
- B. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
- C. Certificates may be recent or previous test results on material or product but must be acceptable to Architect/Engineer.

1.12 MANUFACTURER'S INSTRUCTIONS

- A. Informational Submittal: Submit manufacturer's installation instructions for Architect/Engineer's knowledge as Contract administrator or for Owner.
- B. Submit printed instructions for delivery, storage, assembly, installation, startup, adjusting, and finishing, to Architect/Engineer in quantities specified for Product Data.
- C. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

1.13 MANUFACTURER'S FIELD REPORTS

- A. Informational Submittal: Submit reports for Architect/Engineer's knowledge as Contract administrator or for Owner.
- B. Submit a PDF report within 5 days of observation to Architect/Engineer for information unless it is needed sooner.

- C. Submit reports for information for assessing conformance with information given and design concept expressed in Contract Documents.

1.14 CONSTRUCTION PHOTOGRAPHS

- A. Provide images of Site and construction throughout progress of Work produced by an experienced photographer acceptable to Architect/Engineer.
- B. Submit images with Application for Payment.
- C. Take sufficient Site photographs from different directions and sufficient interior photographs indicating relative progress of the Work, 5 days maximum before submitting pay request, to confirm progress.
- D. Identify digital prints with file name. Identify name of Project, contract number, orientation of view, date and time of view.
- E. Digital Images: Deliver complete set of digital image electronic files on approved media to Architect with project record documents.
 - 1. Digital Images: Uncompressed JPG or other approved format, produced by a digital camera with minimum sensor size of 4.0 megapixels, and image resolution of not less than 1024 by 768 pixels.

1.15 SPECIAL JOB-SITE SUBMITTALS

- A. Hazardous Chemical Inventory:
 - 1. In order to comply with the State of Washington's Hazard Communication Standard (Chapter 296-800-170 WAC) of Washington's Hazard Communication Standard (Chapter 296-800-170 WAC), the Owner requires the Contractor to provide a complete inventory of all potentially hazardous chemicals which the Contractor (including subcontractors) will bring into or produce at the work site. This inventory shall be submitted to the Architect no later than three days prior to the chemicals arrival on site. Specific information for each chemical, in the form of Material Safety Data Sheets (MSDS), and the personal protective equipment required for working with the materials (respirators, special clothing, etc.) shall be included in the submittal.
 - 2. The Contractor shall revise this information as necessary (i.e. when new chemicals are brought onto or produced at the worksite), with updates forwarded to the Architect. A complete and accurate copy of this information shall be immediately available at the Contractor's worksite office for reference by Owner representatives and the Contractor's employees during the Contractor's working hours.
- B. Submit revised inventory monthly or whenever changes are made.

1.16 CONTRACTOR REVIEW

- A. Review for compliance with Contract Documents and approve submittals before transmitting to Architect/Engineer.

- B. Contractor: Responsible for:
 - 1. Determination and verification of materials including manufacturer's catalog numbers.
 - 2. Determination and verification of field measurements and field construction criteria.
 - 3. Checking and coordinating information in submittal with requirements of Work and of Contract Documents.
 - 4. Determination of accuracy and completeness of dimensions and quantities.
 - 5. Confirmation and coordination of dimensions and field conditions at Site.
 - 6. Construction means, techniques, sequences and procedures.
 - 7. Safety precautions.
 - 8. Coordination and performance of Work of all trades.
- C. Stamp, sign or initial and date each submittal to certify compliance with requirements of Contract Documents.
- D. Do not fabricate products or begin Work for which submittals are required until approved submittals have been received from Architect/Engineer.

1.17 ARCHITECT/ENGINEER REVIEW

- A. Do not make "mass submittals" to Architect/Engineer. "Mass submittals" are defined as six or more submittals or items in one day or 20 or more submittals or items in one week. If "mass submittals" are received, Architect/Engineer's review time stated above will be extended as necessary to perform proper review. Architect/Engineer will review "mass submittals" based on priority determined by Architect/Engineer after consultation with Owner and Contractor.
- B. Informational submittals and other similar data are for Architect/Engineer's information, do not require Architect/Engineer's responsive action and will not be reviewed or returned with comment.
- C. Submittals made by Contractor, which are not required by Contract Documents, may be returned without action.
- D. Architect review of submittals does not relieve the Contractor from his responsibilities for conformance with the Contract Documents, proper installation, compliance with applicable codes, or coordination of the Work.
- E. Submittal approval does not authorize changes to Contract requirements unless accompanied by: Change Order, Architect's Supplemental Instruction, Field Order, Substitution Request or Construction Change Directive.
- F. Owner may withhold monies due to Contractor to cover additional costs beyond the second submittal review.

- G. The Architect will stamp each submittal with a uniform, self-explanatory action stamp. The stamp will be marked to indicate the action to be taken.
- H. The Architect will distribute the reviewed submittals to:
 - 1. Architect project file and/or Owner.
 - 2. AHJ (as required)
 - 3. Architect sub-consultants.
 - 4. Contractor.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION



**CONSENT FOR THE RELEASE
OF ELECTRONIC MEDIA**

Project:	Spokane County Library District – Argonne HVAC Upgrades	Recipient:	
Architect's Project No.:	22469.00	Date:	

The Recipient and the Architect hereby approve the release of electronic media as follows:

1. The Recipient agrees, to the fullest extent permitted by law, to indemnify and hold the Architect and its Consultants harmless from any damage, liability, or cost, including reasonable attorney's fees and cost of defense arising from any reuse or modifications of the electronic media by the Recipient or any person or entity which acquires or obtains the electronic media from or through the Recipient. In no event shall the Architect or its Consultants be liable for any loss of profit or any damages.
2. The Architect and Consultants make no warranties, either express or implied, of merchantability and fitness for any particular purpose.
3. Files are recognized to be subject to alteration, degradation, erosion and erasure. The Recipient is advised to check all electronic media for computer viruses before loading the files. The Recipient agrees to indemnify and hold harmless the Architect and its Consultants from and against all claims of any kind put forth by the Recipient or others as a result of inadvertent viruses transmitted with the electronic files.
4. The electronic files are provided as a convenience to the Recipient and are not considered the Contractual Instruments of Service nor considered "Contract Documents" or "Drawings of Record" or "Construction Documents" or "As-Built Drawings."
5. The Architect and Consultants shall be deemed the authors of the transferred media, and will retain all common law, statutory and other reserved rights, in addition to the copyright. Each party shall have the right to alter, modify or delete materials without consequence to the other party, as long as the changes are not attributed to the other party.
6. The information is for use on this project only and not to be used for other purposes.
7. Recipient agrees to compensate Architect and Consultant reasonable costs for preparation of the electronic files as agreed upon.

Approved by Owner:			
Name:		By:	
Date:		Title:	
Approved by Architect:		Accepted by Recipient:	
Name:	Integrus Architecture, P.S.	Name:	
By:		By:	
Title:		Title:	
Date:		Date:	

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Construction Indoor Air Quality (IAQ) Management Plan.

1.2 REFERENCES

A. American Society of Heating, Refrigerating & Air Conditioning Engineers (ASHRAE):

1. ASHRAE 52.2 - Method of Testing General Ventilation Air Cleaning Devices for Removal Efficiency by Particle Size.

B. Sheet Metal and Air Conditioning National Contractors Association (SMACNA):

1. SMACNA IAQ 2nd Edition 2007 - Guideline for Occupied Buildings under Construction, Chapter 3: Control Measures.

C. U.S. Environmental Protection Agency (EPA):

1. EPA IAQ Testing - Compendium of Methods for the Determination of Air Pollutants in Indoor Air.

1.3 PLAN REQUIREMENTS

A. Develop and implement Construction IAQ Management Plan according to SMACNA IAQ as approved by Architect/Engineer

B. Intent:

1. Prevent indoor air quality problems resulting from construction and renovation process.

PART 2 PRODUCTS

2.1 HVAC AIR FILTERS

A. Return Filters: Filtration media rated for minimum efficiency reporting value (MERV) when tested according to ASHRAE 52.2.

1. Construction Return Filters: MERV of 8.
2. Flush-Out Return Filters: MERV of 13.
3. Permanent Filters: As specified in Division 23

B. Supply Filters: Refer to Division 23.

PART 3 EXECUTION

3.1 CONSTRUCTION PROCEDURES - GENERAL

- A. Prevent the absorption of moisture and humidity by absorptive materials by:
 - 1. Sequencing the delivery of such materials so that they are not present in the building until wet work is completed and dry.
 - 2. Delivery and storage of such materials in fully sealed moisture-impermeable packaging.
 - 3. Provide sufficient ventilation for drying within reasonable time frame.
- B. Begin construction ventilation when building is substantially enclosed.
- C. If extremely dusty or dirty work must be conducted inside the building, shut down HVAC systems for the duration; remove dust and dirt completely before restarting systems.
- D. When working in a portion of an occupied building, prevent movement of air from construction area to occupied area or into building HVAC system.
- E. All tools and equipment used within a building return air space shall be equipped with a filter system to reduce the introduction of particulate and odor into the return air.
- F. Fabricated products shall be pre-finished off-site wherever practical and to the greatest extent possible. The use of spray equipment for applying finishes in buildings shall be used only upon approval of Owner.
- G. Do not store construction materials or waste in mechanical or electrical rooms.
- H. Do not perform dusty or dirty work after starting use of return air ducts without intake filters.
- I. During installation of VOC emitting products, provide supplemental (spot) ventilation for at least 72 hours after work is completed and describe these activities in the weekly reports.
- J. Operate HVAC with supply air system only and use exhaust fans to remove air outside of ducted system to avoid contaminating return air ducts.
- K. Conduct regular inspection and maintenance of indoor air quality measures, including ventilation system protection and ventilation rate.
- L. Require VOC safe masks for workers installing VOC emitting products (interior and exterior) defined as products that emit 150 g/L or more.
- M. Use low-toxic cleaning supplies for surfaces, equipment, and worker's personal use.
- N. When dry sanding for gypsum board assemblies, provide the following protection:
 - 1. Isolate the space.

2. Provide plastic sheet separation during sanding.
3. Close and seal all air system devices and ductwork.
4. Sequence construction to avoid contamination of other spaces with gypsum dust.
5. Provide worker protection.

3.2 FILTER INSTALLATION AND REPLACEMENT

- A. Install construction return filter at each return grille before operating permanent air handlers during construction.
- B. Replace filters after completing construction and before conducting building flush-out.
 1. Replace construction return filters with flush-out return filters.
 2. Replace supply filters.
- C. Replace filters after conducting building flush-out and before occupancy.
 1. Replace flush-out return filters with permanent filters.
 2. Replace supply filters.

3.3 IAQ MANAGEMENT PLAN IMPLEMENTATION

- A. The Contractor is required to implement and maintain the approved IAQ Management Plan for the duration of the Project, and to update procedures at any time due to unanticipated building conditions.
- B. Provide reports and photographs of construction IAQ management measures such as protection of ducts and on-site stored or installed absorptive materials. In each report describe and illustrate IAQ measures (installation, effectiveness, upkeep, etc.) during construction along with a description of the SMACNA approach employed.
 1. Provide data sheets of filtration media used during construction and installed immediately prior to building flush out and prior to building occupancy.

3.4 REMOVAL

- A. Remove all IAQ measures as well as signs, framing, and supports at completion of project. If an IAQ measure may, in the Contractor's opinion, remain confirm this in advance with the Owner's Representative before leaving it in place.

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Quality control.
- B. Tolerances.
- C. References.
- D. Labeling.
- E. Mockup requirements.
- F. Testing and inspection services.
- G. Manufacturers' field services.

1.2 QUALITY CONTROL

- A. Monitor quality control over suppliers, manufacturers, products, services, Site conditions, and workmanship, to produce Work of specified quality.
- B. Comply with specified standards as the minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- C. 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. Specific quality-control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
- D. Perform Work using persons qualified to produce required and specified quality.
- E. Products, materials, and equipment may be subject to inspection by Architect/Engineer and Owner at place of manufacture or fabrication. Such inspections shall not relieve Contractor of complying with requirements of Contract Documents.
- F. Supervise performance of Work in such manner and by such means to ensure that Work, whether completed or in progress, will not be subjected to harmful, dangerous, damaging, or otherwise deleterious exposure during construction period.
- G. Maintain project superintendent continually on Project site for duration of Work of this Contract. Do not engage project superintendent in work other than Work of this Contract.
- H. Comply fully with manufacturers' instructions, including each step in sequence.

1. Should manufacturers' instructions conflict with Contract Documents; request clarification from Architect before proceeding.
- I. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents. Submit schedule within thirty (30) days of date established for the Notice to Proceed.
 1. Distribution: Distribute schedule to Owner, Architect testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

1.3 TOLERANCES

- A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.
- B. Comply with manufacturers' recommended tolerances and tolerance requirements in reference standards. When such tolerances conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.
- C. Adjust products to appropriate dimensions; position before securing products in place.
- D. Allow tolerances for thermal expansion and effects of mechanical vibration.

1.4 REFERENCES

- A. For products or workmanship specified by association, trade, or other consensus standards, comply with requirements of standard except when more rigid requirements are specified or are required by applicable codes.
- B. Conform to reference standard by date of issue current as of date of Contract Documents except where specific date is established by code.
- C. Obtain copies of standards and maintain on Site when required by product Specification Sections.
- D. When requirements of indicated reference standards conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.
- E. Neither contractual relationships, duties, or responsibilities of parties in Contract nor those of Architect/Engineer shall be altered from Contract Documents by mention or inference in reference documents.

- F. Abbreviations and Names: Abbreviations and acronyms are frequently used in the Specifications and other Contract Documents to represent the name of a trade association, standards developing organization, authorities having jurisdiction, or other entity in the context of referencing a standard or publication. Where abbreviations and acronyms are used in the Specifications or other Contract Documents, they mean the recognized name of the entities. Refer to Gale Research's "Encyclopedia of Associations" or Columbia Books' "National Trade and Professional Associations of the U.S.," which are available in most libraries or a search engine dedicated to construction industry data such as <http://www.4specs.com> or <http://www.arcat.com>.

1.5 LABELING

- A. Attach label from agency approved by authorities having jurisdiction for products, assemblies, and systems required to be labeled by applicable code.
- B. Label Information: Include manufacturer's or fabricator's identification, approved agency identification, and the following information, as applicable, on each label:
 - 1. Model number.
 - 2. Serial number.
 - 3. Performance characteristics.
- C. Manufacturer's Nameplates, Trademarks, Logos, and Other Identifying Marks on Products: Not allowed on surfaces exposed to view in public areas, interior or exterior.

1.6 MOCK-UP REQUIREMENTS

- A. Tests will be performed under provisions identified in this Section and identified in individual product Specification Sections.
- B. Assemble and erect specified or indicated items with specified or indicated attachment and anchorage devices, flashings, seals, and finishes.
- C. Accepted mockups shall be comparison standard for remaining Work.
- D. Where mockup has been accepted by Architect/Engineer and is specified in product Specification Sections to be removed, remove mockup and clear area when directed to do so by Architect/Engineer.

1.7 TESTING AND INSPECTION SERVICES

- A. Owner will employ and pay for specified services of an independent firm to perform testing and inspection.
- B. Independent firm will perform tests, inspections, and other services specified in individual Specification Sections and as required by Architect/Engineer, Owner or authorities having jurisdiction.
 - 1. Laboratory: Authorized to operate at Project location.

2. Laboratory Staff: Maintain full-time specialist on staff to review services.
 3. Testing Equipment: Calibrated at reasonable intervals with devices of an accuracy traceable to National Bureau of Standards or accepted values of natural physical constants.
- C. Testing, inspections, and source quality control may occur on or off Project Site. Perform off-Site testing as required by Architect/Engineer or Owner.
- D. Reports shall be submitted by independent firm to Architect/Engineer, Contractor and authorities having jurisdiction, in PDF format indicating observations and results of tests and compliance or noncompliance with Contract Documents.
1. Submit final report indicating correction of Work previously reported as noncompliant.
- E. Concrete test reports shall show time and date samples were taken, specific location of concrete placement, slump, air content, ambient air temperature, concrete temperature, date received by lab, field data submitted by, mix number, delivery ticket number, specified strength requirement, 1-7 day break, 2-28 day breaks, any field cylinder breaks as requested by Special Inspector or Architect, day projected high and low temperatures and weather conditions.
- F. Cooperate with independent firm; furnish samples of materials, design mix, equipment, tools, storage, safe access, and assistance by incidental labor as requested.
1. Notify Architect/Engineer and independent firm 24 hours before expected time for operations requiring services.
 2. Make arrangements with independent firm and pay for additional Samples and tests required for Contractor's use.
- G. Employment of testing agency or laboratory shall not relieve Contractor of obligation to perform Work according to requirements of Contract Documents.
- H. Special Inspections: In addition to the testing specified herein, the Owner will employ one or more special inspectors who will provide continuous inspections during construction on the following types of work as required:
1. Concrete: During the taking of test specimens and placing of reinforced concrete and pneumatically placed concrete. Non-structural slabs on grade and site work concrete fully supported on earth do not require special inspection.
 2. Bolts Installed in Concrete and Masonry: During installation of bolts and placing of concrete around such bolts as indicated.
 3. Reinforcing Steel: During placing of reinforced steel, for all concrete required to have special inspection by Item No. 1. The Special Inspector need not be present during entire reinforcing steel-placing operations, provided he has inspected for conformance with the approved plans, prior to the closing of forms and final inspection of forms prior to the delivery of concrete to the jobsite.

4. Welding: All structural welding, including welding of reinforcing steel as indicated.
 5. High-Strength Bolting: During all bolt installations and tightening operations. The Special Inspector need not be present during the entire installation and tightening operation for load indicator bolts, provided he has:
 - a. Inspected the surfaces and bolt type for conformance to plans, specifications and shipping certification prior to start of bolting.
 - b. Observed initial bolting operation for proper sequencing.
 - c. And will, upon completion of all bolting, verify visually all connections.
 6. Structural Masonry: During placing of all masonry units, placement of reinforcement and bar positioners, bolts, inspection of grout space, immediately prior to closing of cleanouts, and during all grouting operations.
 7. Special Grading, Excavation and Filling: During earthwork excavations, grading and filing operations.
- I. The Contractor shall arrange and pay for all inspection and testing required by the Contract Documents except for tests specifically indicated herein as the responsibility of the Owner. The Contractor shall also be responsible for all costs of all inspections and testing including, but not limited to, the following:
1. Re-inspection and/or retesting of Owner provided inspections or testing due to failure.
 - a. Retesting or re-inspection required because of nonconformance with specified or indicated requirements shall be performed by same independent firm on instructions from Architect/Engineer. Payment for retesting or re-inspection will be charged to Contractor by deducting testing charges from Contract Sum/Price.
 2. Concrete testing for qualifications of materials and for Contractor's convenience.
 3. Testing required because of changes in materials or proportions at the request of the Contractor.
 4. Contractor's duties for owner provided inspections and tests, as specified.
- J. Agency Responsibilities:
1. Test Samples of mixes submitted by Contractor.
 2. Provide qualified personnel at Site. Cooperate with Architect/Engineer and Contractor in performance of services.
 3. Perform indicated sampling and testing of products according to specified standards.
 4. Ascertain compliance of materials and mixes with requirements of Contract Documents.

5. Promptly notify Architect/Engineer and Contractor of observed irregularities or nonconformance of Work or products.
 6. Perform additional tests required by Architect/Engineer.
 7. Attend preconstruction meetings and progress meetings.
- K. Agency Reports: After each test, promptly submit PDF copies of report to Architect/Engineer, Contractor, and authorities having jurisdiction. When requested by Architect/Engineer, provide interpretation of test results. Include the following:
1. Date issued.
 2. Project title and number.
 3. Name of inspector.
 4. Date and time of sampling or inspection.
 5. Identification of product and Specification Section.
 6. Location in Project.
 7. Type of inspection or test.
 8. Date of test.
 9. Results of tests.
 10. Conformance with Contract Documents.
- L. Limits on Testing Authority:
1. Agency or laboratory may not release, revoke, alter, or enlarge on requirements of Contract Documents.
 2. Agency or laboratory may not approve or accept any portion of the Work.
 3. Agency or laboratory may not assume duties of Contractor.
 4. Agency or laboratory has no authority to stop the Work.
- M. Approved Fabricator Shop Certificate: Special inspection per IBC Section 1704 shall not be required where the work is done on the premises of a fabricator registered and approved by the Building Official to perform such work without special inspection. Provide a certificate from the Building Official which shows the shop approval.
- N. Non-Approved Fabricator Special Inspection: The Contractor shall reimburse the Owner for the costs incurred for special inspection of fabrication in a non-approved shop.

1.8 MANUFACTURER'S FIELD SERVICES

- A. When specified in individual Specification Sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe Site conditions, conditions of surfaces and installation, quality of workmanship, startup of equipment, testing, adjusting, and balancing of equipment and commissioning as applicable, and to initiate instructions when necessary.
- B. Submit qualifications of observer to Architect/Engineer 30 days in advance of required observations. Observer is subject to approval of Architect/Engineer.
- C. Report observations and Site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturer's written instructions.
- D. Refer to Section 013300 - Submittal Procedures, "Manufacturer's Field Reports" Article.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 TEST AND INSPECTION LOG

- A. 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 Architect.
 - 4. Identification of testing agency or special inspector conducting test or inspection.
- B. Maintain log at Project Site. Post changes and modifications as they occur. Provide access to test and inspection log for Architect's reference during normal working hours.

3.2 ACCEPTABLE TESTING AGENCIES

- A. Testing Agency used to be approved by Owner and Architect.

3.3 REPAIR AND PROTECTION

- A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
 - 1. Comply with the Contract Document requirements. See Section 017000 – Execution and Closeout Requirements.
- 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

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes
 - 1. Temporary Utilities
 - 2. Construction Facilities
 - 3. Temporary Controls
 - 4. Removal of utilities, facilities, and controls.

1.2 PROTECTION OF EXISTING UTILITIES

- A. Concealed utilities of record are shown on Drawings. These are not necessarily exact with respect to location or completeness.
- B. Notify Owner in writing, on each occasion, of intent to work near or on existing underground utility services or structures that may affect Owner occupied portions of Project Site. Submit procedure for safe and continuous operation of services. Do not proceed prior to approval.
- C. Proceed with sufficient caution to preclude damaging utilities known or unknown. In event unidentified utilities are encountered, promptly notify Owner.
- D. In the event Owner's utilities are damaged during construction, promptly provide temporary services and make repairs to maintain continuity of services at the Contractor's expense.

1.3 TEMPORARY ELECTRICITY

- A. Owner will pay cost of energy used. Exercise measures to conserve energy. Use Owner's existing power service.
- B. Complement existing power service capacity and characteristics as required for construction operations.
- C. Permanent convenience receptacles may be used during construction. Replace any damaged receptacles caused by this use.

1.4 TEMPORARY LIGHTING FOR CONSTRUCTION PURPOSES

- A. Permanent building lighting may be used during construction with Owner approval. Re-lamp all fixtures used for temporary lighting at substantial completion and provide documentation.

1.5 TEMPORARY HEATING

- A. Where construction is in progress, provide a dust free atmosphere and heating for curing, reducing moisture and humidity and suitable temperatures for installation of specified products unless indicated otherwise in specifications. Maintain minimum ambient temperature of 50 degrees F in areas where construction is in progress unless indicated otherwise in individual product Sections.
- B. Portable Heaters: Electric, non-combustion, forced air fan units complete with controls, acceptable to Owner and Architect. Use of heaters that generate moisture or hazardous fumes are prohibited.

1.6 TEMPORARY COOLING

- A. Existing cooling systems shall not be used during construction.
- B. Provide and pay for cooling devices and cooling as needed to maintain specified conditions for construction operations. Provide separate metering and reimburse Owner for cost of energy used.

1.7 TEMPORARY VENTILATION

- A. Ventilate enclosed areas to achieve curing of materials, to dissipate humidity and to prevent accumulation of dust, fumes, vapors or gases.
- B. When hazardous chemicals, mineral-spirit based paints, adhesives, or other similar materials are used, the Contractor shall exhaust toxic, noxious, or odor producing fumes from the building. Method of exhaust shall ensure safety of building occupants and pedestrians in and around the project site. All existing building supply and return air ductwork within the construction area shall be capped air-tight to prevent distribution of fumes throughout the building.
- C. Replace filters, clean and lubricate system prior to acceptance by Owner.

1.8 COMMUNICATION SERVICES

- A. Provide, maintain and pay for telephone service to field office at time of project mobilization. At each telephone, post a list of important telephone numbers.
 - 1. Police and fire departments.
 - 2. Ambulance service.
 - 3. Contractor's home office.
 - 4. Architect's office.
 - 5. Owner's Office.
 - 6. Principal subcontractors' field and home offices.
 - 7. All site phone lines.

- B. Provide mobile telephone for superintendent's use, to be operational and kept on his/her person at all times during working hours under this contract.
- C. Internet Service: Provide, maintain, and pay for broadband Internet service to field office at time of Project mobilization. Provide desktop computer with Microsoft operating system and appropriate office function software, modem and printer.

1.9 TEMPORARY WATER SERVICE

- A. Owner will pay cost of temporary water. Exercise measures to conserve energy. Use Owner's water system, extended and supplemented with temporary devices (provided at Contractor's expense) as needed to maintain specified conditions for construction operations.
- B. Drinking Water: General Contractor to furnish from a proven safe source for all those connected with the work. Pipe or transport in such manner as to keep it clean and fresh. Serve in single service containers or by sanitary drinking fountains.

1.10 TEMPORARY SANITARY FACILITIES

- A. Provide and maintain required facilities and enclosures. Existing facility use is not permitted. Provide facilities at time of Project mobilization.

1.11 FIELD OFFICES AND SHEDS

- A. Provide Field Office: Weathertight, with lighting, electrical outlets, heating, cooling and ventilating equipment, and equipped with sturdy furniture including: conference table, drawing rack, filing cabinets and drawing display table.
- B. Provide space for Project meetings, with table and chairs to accommodate six persons.
- C. Installation:
 - 1. Install field office spaces ready for occupancy 15 days after date established by Notice to Proceed.
 - 2. Employee Residential Occupancy: Not allowed on Owner's property.
- D. Maintenance and Cleaning:
 - 1. Weekly janitorial services for field offices; periodic cleaning and maintenance for sheds and storage areas.
 - 2. Maintain walks free of mud, water, snow and the like.
- E. Removal: At completion of Work remove buildings, foundations, utility services and debris. Restore areas to same or better condition as original condition.

1.12 VEHICULAR ACCESS

- A. Provide unimpeded access for emergency vehicles. Maintain 20 foot wide driveways with turning space between and around combustible materials.
- B. Provide and maintain access to fire hydrants and control valves free of obstructions.

1.13 PARKING

- A. Locate as approved by Architect/Engineer.
- B. If Site space is not adequate, provide additional off-Site parking.
- C. Do not allow heavy vehicles or construction equipment in parking areas.
- D. Maintenance:
 - 1. Maintain traffic and parking areas in sound condition free of excavated material, construction equipment, products, mud, snow, ice and the like.
- E. Removal, Repair:
 - 1. Repair facilities damaged by use, to original condition.

1.14 PROGRESS CLEANING AND WASTE REMOVAL

- A. Maintain areas free of waste materials, debris, and rubbish. Maintain Site in clean and orderly condition.
- B. Broom and vacuum clean interior areas before starting surface finishing and continue cleaning to eliminate dust.
- C. Collect and remove waste materials, debris, and rubbish from Site weekly and dispose of off-Site. Comply with Section 017419 - Construction Waste Management and Disposal.
- D. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.
- E. Dispose of flammable, hazardous and toxic waste materials on daily bases. Do not permit storage inside buildings.
- F. Provide vehicles to haul materials off site that are constructed and loaded so as to prevent any leaking of materials from the vehicle (RCW 46.61.655). Keep sidewalks, lawns, parking areas and streets clear of all construction materials, debris, gravel, rock and dirt attributed to the General Contractor or the sub-contractors. Clean up these areas on a daily and/or "upon request" basis as determined by the Architect's representative.

1.15 PROJECT IDENTIFICATION

- A. Project Identification Sign:

1. One painted sign, 32-sq ft area, with bottom at 6 feet aboveground.
 2. Content:
 - a. Project title and name of Owner.
 - b. Names and titles of authorities.
 - c. Names and titles of Architect/Engineer and Consultants.
 - d. Name of Prime Contractor and major Subcontractors.
 3. Graphic Design, Colors, and Style of Lettering: approved by Architect/Engineer.
- B. Project Informational Signs:
1. Painted informational signs of same colors and lettering as Project identification sign or standard products; size lettering for legibility at 100-foot distance.
 2. Provide sign at each field office and storage shed and provide directional signs to direct traffic into and within Site. Relocate as Work progress requires.
 3. No other signs are allowed without Owner's permission except those required by law.
- C. Design sign and structure to withstand 60-mph wind velocity.
- D. Sign Painter: Experienced as professional sign painter for minimum of three years.
- E. Finishes, Painting: Adequate to withstand weathering, fading and chipping for duration of construction.
- F. Sign Materials:
1. Structure and Framing: structurally adequate.
 2. Sign Surfaces: Exterior grade plywood with medium-density overlay, minimum of 3/4 inches thick, standard large sizes to minimize joints.
 3. Paint and Primers: Exterior quality, two coats; sign background of color as selected.
 4. Lettering: Precut vinyl self-adhesive products, white.
- G. Installation:
1. Install Project identification sign within 15 days after date established by Notice to Proceed.
 2. Erect at approved location of high public visibility adjacent to main entrance to Site.
 3. Erect supports and framing on secure foundation, rigidly braced and framed to resist wind loadings.

- 4. Install sign surface plumb and level, with butt joints. Anchor securely.
- 5. Paint exposed surfaces of sign, supports and framing.
- H. Maintenance: Maintain clean signs and supports; repair deterioration and damage.
- I. Removal: Remove signs, framing, supports and foundations at completion of Project and restore area.
- J. No other signs are allowed without Owner permission except those required by law.

1.16 FIRE-PREVENTION FACILITIES

- A. Prohibit smoking within buildings under construction and demolition.
- B. Establish fire watch for cutting, welding, and other hazardous operations capable of starting fires. Maintain fire watch before, during, and after hazardous operations until threat of fire does not exist.
- C. Portable Fire Extinguishers: NFPA 10; 10-pound capacity, 4A-60B: C UL rating.
 - 1. Provide one fire extinguisher at each stairway on each floor of buildings under construction and demolition.
 - 2. Provide minimum of one fire extinguisher in every construction trailer and storage shed.
 - 3. Provide minimum of one fire extinguisher on roof during roofing operations using heat-producing equipment.

1.17 BARRIERS

- A. Provide barriers to prevent unauthorized entry to construction areas and to protect existing facilities and adjacent properties from damage from construction operations and demolition.
- B. Protect non-owned vehicular traffic, stored materials, Site, and structures from damage.

1.18 EXISTING TREE AND PLANT PROTECTION

- A. The Contractor shall protect all trees and other plant types on site from damage until project completion. If any tree or other type of plants are destroyed, disfigured, or damaged so that in Architect's opinion removal is required, Contractor will be assessed damages to include the cost of removal and the cost for replacement of a comparably mature tree or plant including maintenance and a guarantee of replacement if the tree or plant fails to thrive for one full year following Final Completion.

1.19 TRAFFIC AND PEDESTRIAN OBSTRUCTIONS

- A. Provide signs and/or flagpersons in accordance with WAC 296-155-305 and RCW 47.36.200 for deliveries or operations which obstruct traffic in the street.

- B. Contractor's equipment located on sidewalks or other pedestrian ways shall be suitably barricaded for cane detection as a warning for sight impaired persons. Barricade shall include a horizontal member at a maximum of two feet above the walking surface. Pedestrian traffic will be diverted with appropriate signs, barricades, fences, etc., from any area where contractor equipment or operations may pose a threat to the safety and health of passing pedestrians.

1.20 ENCLOSURES AND FENCING

- A. Exterior Enclosures:

- 1. Provide temporary insulated, weathertight closure of exterior openings to accommodate acceptable working conditions and protection for products, to allow for temporary heating and maintenance of required ambient temperatures identified in individual Specification Sections, and to prevent entry of unauthorized persons. Provide access doors with self-closing hardware and locks.

- B. Interior Enclosures:

- 1. Provide temporary partitions and ceilings as indicated on Drawings to separate work areas from Owner-occupied areas, to prevent penetration of dust and moisture into Owner-occupied areas, and to prevent damage to existing materials and equipment.

1.21 SECURITY

- A. Security Program:

- 1. Protect Work on existing premises and Owner's operations from theft, vandalism, and unauthorized entry.

1.22 DUST CONTROL

- A. Execute Work by methods that minimize raising dust from construction operations.
- B. Provide positive means to prevent airborne dust from dispersing into atmosphere.

1.23 NOISE CONTROL

- A. Provide methods, means and facilities to minimize noise produced by construction operations to level required by AHJ.

1.24 PEST AND RODENT CONTROL

- A. Provide methods, means, and facilities to prevent rodents from accessing or invading premises.

1.25 POLLUTION CONTROL

- A. Comply with pollution and environmental control requirements of authorities having jurisdiction.

1.26 HAZARDOUS MATERIALS SPILLS

- A. If hazardous materials are released on the construction premises, a record of type of materials spilled, quantity, containment, cleanup, decontamination and disposal mechanisms used, reports made to regulatory agencies, and records of regulatory agency activity, if any, shall be kept by the Contractor and provided to Architect.
- B. Contractor and all subcontractors shall immediately report all spills of hazardous materials to Architect.
- C. The Contractor shall be responsible for spill containment, regulatory reporting, cleanup, decontamination, and waste disposal which meets WAC 173-340 and 173-303. See Section 017419 - Construction Waste Management, "Dangerous Waste Management," for additional information regarding disposal of hazardous materials.

1.27 REMOVAL OF FACILITIES, AND CONTROLS

- A. Remove equipment, facilities and materials before Substantial Completion inspection.
- B. Clean and repair damage caused by installation or use of temporary Work.
- C. Restore facilities used during construction to original condition. Restore permanent facilities used during construction to specified condition.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes
 - 1. Products.
 - 2. Product delivery requirements.
 - 3. Product storage and handling requirements.
 - 4. Product options.
 - 5. Damaged Products.
 - 6. General Product Requirements.

1.2 PRODUCTS

- A. At minimum, comply with specified requirements and reference standards.
- B. Specified products define standard of quality, type, function, dimension, appearance and performance required.
- C. Furnish products of qualified manufacturers that are suitable for intended use. Furnish products of each type by single manufacturer unless specified otherwise. Confirm that manufacturer's production capacity can provide sufficient product, on time, to meet Project requirements.
- D. Where Specifications include the phrase "as selected from manufacturer's colors, patterns, textures" or a similar phrase, select a product (and manufacturer) that complies with other specified requirements.
 - 1. Standard Range: Where Specifications include the phrase "standard range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, or texture from manufacturer's product line that does not include premium items.
 - 2. Full Range: Where Specifications include the phrase "full range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, or texture from manufacturer's product line that includes both standard and premium items.

1.3 PRODUCT DELIVERY REQUIREMENTS

- A. Comply with delivery requirements in Section 017419 - Construction Waste Management and Disposal.
- B. Schedule delivery of products affecting Progress Schedule critical path to complete project within time of completion stated in the Agreement. Associated cost increases due to failure to meet accelerated delivery schedules and deliveries of long lead time products are responsibility of Contractor.

- C. Coordinate to avoid conflict with work and site conditions. Limit long term site storage, overcrowding of limited storage space, and conflict with available equipment and personnel for handling Products.
- D. Coordinate delivery to limit storage time for Products that are flammable, hazardous, easily damaged, subject to deterioration, or liable for theft or loss.
- E. Transport and handle products according to manufacturer's instructions.
- F. Promptly inspect shipments to ensure products comply with requirements, quantities are correct, and products are undamaged.
- G. Provide equipment and personnel to handle products; use methods to prevent soiling, disfigurement, or damage.

1.4 PRODUCT STORAGE REQUIREMENTS

- A. Store and protect products according to manufacturer's instructions.
- B. Store products with seals and labels intact and legible.
- C. Store sensitive products in weathertight, climate-controlled enclosures in an environment suitable to product.
- D. For exterior storage of fabricated products, place products on sloped supports aboveground.
- E. Provide bonded off-Site storage and protection when Site does not permit on-Site storage or protection.
- F. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
- G. Store loose granular materials on solid flat surfaces in well-drained area. Prevent mixing with foreign matter.
- H. Provide equipment and personnel to store products; use methods to prevent soiling, disfigurement, or damage.
- I. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

1.5 PRODUCT HANDLING REQUIREMENTS

- A. Provide equipment and personnel necessary to handle Products, including those furnished by Owner, by methods to prevent soiling, damage, or loss of Products and protective packaging.
- B. Provide additional protection during handling as necessary to prevent scraping, marring, and other damage to Products and surrounding surfaces.
- C. Handle Products by methods to prevent bending or overstressing.

- D. Lift heavy components only at designated lifting points.

1.6 DAMAGED PRODUCTS

- A. Promptly remove damaged and deteriorated Products from premises. Replace with new undamaged materials conforming to Contract Documents.

1.7 PRODUCT OPTIONS

- A. Products Specified by Naming One or More Manufacturers with Provision for Substitutions: Submit Request for Substitution for any manufacturer not named, according to Section 012500 - Substitution Procedures.

PART 2 PRODUCTS

2.1 GENERAL PRODUCT REQUIREMENTS

- A. Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, new at the time of installation.
 - 1. Provide products complete with accessories, trim, finish, safety guards, and other devices and details needed for a complete installation and the intended use and effect.
 - 2. Standard Products: Where available, provide standard products of types which have been produced and used previously and successfully on other projects and in similar application.
 - 3. Color and Appearance Consistency of Finish Materials: All finish materials of their respective kinds, in regards to construction phasing, shall be consistent in color and appearance throughout the total Project and shall be purchased out of one dye lot, production run, batch, etc., as applicable, for the total Project for each respective material.
- B. Additional Requirements: Material and equipment incorporated in to the work:
 - 1. Shall conform to applicable specifications and standards.
 - 2. Shall comply with size, make, type and quality specified or as specifically approved in writing by Architect.
 - 3. Shall be free of ASBESTOS, FORMALDEHYDE and LEAD.
 - 4. Manufactured and Fabricated Products:
 - a. Manufacture like parts of duplicate units to standard sizes and gauges; parts to be interchangeable.
 - b. Two or more items of the same kind to be identical and by same manufacturer (whether furnished under one Section or more).

- c. Products shall be suitable for service conditions. Adhere to indicated equipment capacities, sizes, and dimensions unless variations are specifically approved in writing.
- d. Except where field finishing is specified or otherwise required, products and fabricated items shall be pre-finished off-site.
- e. Do not use materials and equipment for other than designed or specified purposes and uses.

PART 3 EXECUTION - NOT USED

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes
 - 1. Starting of systems.
 - 2. Testing, adjusting, and balancing.
 - 3. Project record documents.
 - 4. Execution
 - 5. Cutting and patching.
 - 6. Special Procedures.
 - 7. Protecting installed construction.

1.2 STARTING OF SYSTEMS

- A. Coordinate schedule for startup of various equipment and systems.
- B. Notify Architect/Engineer seven days prior to startup of each item.
- C. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions which may cause damage.
- D. Verify that tests, meter readings, and electrical characteristics agree with those required by equipment or system manufacturer.
- E. Verify that wiring and support components for equipment are complete and tested.
- F. Execute startup under supervision of manufacturer's representative or Contractors' personnel according to manufacturer's instructions.
- G. When specified in individual Specification Sections, require manufacturer to provide authorized representative who will be present at Site to inspect, check, and approve equipment or system installation prior to startup and will supervise placing equipment or system in operation.
- H. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.
- I. Submit a report, PDF format preferred according to Section 013300 - Submittal Procedures that equipment or system has been properly installed and is functioning correctly.

1.3 TESTING, ADJUSTING, AND BALANCING

- A. Owner will appoint, employ, and pay for services of independent firm to perform testing, adjusting, and balancing.
- B. Reports will be submitted by independent firm to Architect/Engineer indicating observations and results of tests and indicating compliance or noncompliance with requirements of Contract Documents.

1.4 PROJECT RECORD DOCUMENTS

- A. Maintain on Site one set of the following record documents; record actual revisions to the Work:
 - 1. Drawings.
 - 2. Specifications.
 - 3. Addenda.
 - 4. Change Orders and other modifications to the Contract.
 - 5. Reviewed Shop Drawings, product data, and Samples.
 - 6. Manufacturer's instruction for assembly, installation, and adjusting.
- B. Ensure entries are complete and accurate, enabling future reference by Owner.
- C. Store record documents separate from documents used for construction.
- D. Record information concurrent with construction progress, not less than weekly.
- E. Specifications: Legibly mark and record, at each product Section, description of actual products installed, including the following:
 - 1. Manufacturer's name and product model and number.
 - 2. Product substitutions or alternates used.
 - 3. Changes made by Addenda and modifications.
- F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction as follows:
 - 1. Include Contract modifications such as Addenda, supplementary instructions, change directives, field orders, minor changes in the Work, and change orders.
 - 2. Include locations of concealed elements of the Work.
 - 3. Identify depth of buried utility lines and provide dimensions showing distances from permanent facility components that are parallel to utilities.

4. Dimension ends, corners, and junctions of buried utilities to permanent facility components using triangulation.
 5. Identify and locate existing buried or concealed items encountered during Project.
 6. Measured depths of foundations in relation to finish floor datum.
 7. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 8. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
 9. Field changes of dimension and detail.
 10. Details not on original Drawings.
 11. Provide photographs of congested areas before closed in by Gyp or finishes.
- G. Submit PDF electronic files of marked-up documents to Architect/Engineer before Substantial Completion.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that existing Site conditions and substrate surfaces are acceptable for subsequent Work. Beginning new Work means acceptance of existing conditions.
- B. Verify that existing substrate is capable of structural support or attachment of new Work being applied or attached.
- C. Examine and verify specific conditions described in individual Specification Sections.
- D. Verify that utility services are available with correct characteristics and in correct locations.
- E. Installer's Inspection of Conditions
 1. Require Installer of each major unit of work to inspect substrate to receive the work, and conditions under which the work will be performed, and to report (in writing to Contractor) unsatisfactory conditions.
 2. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to Installer.
- F. Contractor's Inspection. Inspect each item of material or equipment immediately prior to installation, and reject damaged and defective items.

3.2 PREPARATION

- A. Clean substrate surfaces prior to applying next material or substance according to manufacturer's instructions.
- B. Seal cracks or openings of substrate prior to applying next material or substance.
- C. Apply manufacturer-required or -recommended substrate primer, sealer, or conditioner prior to applying new material or substance in contact or bond.

3.3 EXECUTION

- A. Comply with manufacturer's installation instructions, performing each step in sequence. Maintain one set of manufacturer's installation instructions at Project Site during installation and until completion of construction.
- B. When manufacturer's installation instructions conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.
 - 1. Do not omit any preparatory step or installation procedure unless it is:
 - a. Verified with and accepted by Architect in writing.
 - b. Specifically modified or exempted by Contract Documents.
- C. Perform additional requirements that are specified which are greater than the manufacturer's requirements and do not have a deleterious effect on the product being installed.
- D. Verify that field measurements are as indicated on approved Shop Drawings or as instructed by manufacturer.
- E. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.
 - 1. Secure Work true to line and level and within specified tolerances, or if not specified, industry-recognized tolerances.
 - 2. Physically separate products in place, provide electrical insulation, or provide protective coatings to prevent galvanic action or corrosion between dissimilar metals.
 - 3. Exposed Joints: Provide uniform joint width and arrange to obtain best visual effect. Refer questionable visual-effect choices to Architect/Engineer for final decision.
- F. Allow for expansion of materials and building movement.
- G. Climatic Conditions and Project Status: Install each unit of Work under conditions to ensure best possible results in coordination with entire Project.
 - 1. Isolate each unit of Work from incompatible Work as necessary to prevent deterioration.

2. Coordinate enclosure of Work with required inspections, photographs and tests to minimize necessity of uncovering Work for those purposes.
- H. Mounting Heights: Where not indicated, mount individual units of Work at industry recognized standard mounting heights for particular application indicated.
1. Refer questionable mounting heights choices to Architect/Engineer for final decision.
 2. Elements Identified as Accessible to Handicapped: Comply with applicable codes and regulations.
- I. Adjust operating products and equipment to ensure smooth and unhindered operation.
- J. Clean and perform maintenance on installed Work as frequently as necessary through remainder of construction period. Lubricate operable components as recommended by manufacturer.

3.4 CUTTING AND PATCHING

- A. Employ skilled and experienced installers to perform cutting and patching.
- B. Submit request in advance of cutting or altering elements affecting:
1. Structural integrity of element.
 2. Integrity of weather-exposed or moisture-resistant elements.
 3. Efficiency, maintenance or safety of element.
 4. Visual qualities of sight-exposed elements.
 5. Work of Owner or separate contractor.
- C. Execute cutting, fitting, and patching, including excavation and fill to complete Work and to:
1. Fit the several parts together, to integrate with other Work.
 2. Uncover Work to install or correct ill-timed Work.
 3. Remove and replace defective and nonconforming Work.
 4. Remove samples of installed Work for testing.
 5. Provide openings in elements of Work for penetrations of mechanical and electrical Work.
- D. Structural Work: Conform to Structural requirements for cutting of structural members. Do no cutting of structural elements that could reduce structural load capacity, deflection ratio, or integrity of structural systems without prior direction from Structural Engineer.
- E. Plumbing, Heating, Ventilating and Air Conditioning, and Electrical Work: Refer to Division 22, Division 23, and Division 26.

- F. Execute Work by methods to avoid damage to other Work and to provide proper surfaces to receive patching and finishing.
- G. Cut masonry and concrete materials using masonry saw or core drill.
- H. Restore Work with new products according to requirements of Contract Documents.
- I. Fit Work tight to pipes, sleeves, ducts, conduits and other penetrations through surfaces.
- J. Maintain integrity of wall, ceiling, or floor construction; completely seal voids.
- K. At penetrations of fire-rated walls, partitions, ceiling, or floor construction, completely seal voids with material according to Section 078400 - Firestopping, to full thickness of penetrated element.
- L. Refinish surfaces to match adjacent finishes. For continuous surfaces, refinish to nearest intersection; for assembly, refinish entire unit.
- M. Identify hazardous substances or conditions exposed during the Work to Architect/Engineer for decision or remedy.
- N. Leave areas clean and free from debris. Remove spillage, soiling, sealants and overspray from finished surfaces.

3.5 PROTECTING INSTALLED CONSTRUCTION

- A. In-Place Protection
 - 1. General
 - a. During handling and installation of work at project site, clean and protect work in progress and adjoining work on a basis of perpetual maintenance.
 - b. Clean and perform maintenance on newly installed work as frequently as necessary through remainder of construction period.
 - c. Adjust and lubricate moving components to ensure operability without damaging effects. Contractor is responsible for function, condition and unblemished appearance of all work on Project, and any item or work judged defective by Architect shall be subject to replacement at no additional cost to Owner.
- B. To extent possible through reasonable control and protection methods, supervise performance of work in a manner and by means which will ensure that none of the work, whether completed or in progress, will be subjected to harmful, dangerous, damaging, or otherwise deleterious exposures during construction period.
- C. Protect installed Work and provide special protection where specified in individual Specification Sections.

- D. Provide temporary and removable protection for installed products. Control activity in immediate Work area to prevent damage.
- E. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
- F. Use durable sheet materials to protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects.
- G. Prohibit traffic or storage upon waterproofed or roofed surfaces. When traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.
- H. Prohibit traffic from landscaped areas.
- I. Remove protective devices when no longer needed, prior to completion of work

3.6 SPECIAL PROCEDURES

- A. Materials: As specified in product sections; match existing with new products and salvaged products for patching and extending work.
- B. Employ skilled and experienced installer to perform alteration work.
- C. Cut, move, or remove items as necessary for access to alterations and renovation Work. Replace and restore at completion.
- D. Remove unsuitable material not marked for salvage, including rotted wood, corroded metals, and deteriorated masonry and concrete. Replace materials as specified for finished Work.
- E. Remove debris and abandoned items from area and from concealed spaces.
- F. Prepare surface and remove surface finishes to permit installation of new work and finishes.
- G. Close openings in exterior surfaces to protect existing work from weather and extremes of temperature and humidity.
- H. Remove, cut, and patch Work in manner to minimize damage and to permit restoring products and finishes to original condition.
- I. Refinish existing visible surfaces to remain in renovated rooms and spaces, to specified condition for each material, with neat transition to adjacent finishes.
- J. Where new Work abuts or aligns with existing, provide smooth and even transition. Patch Work to match existing adjacent Work in texture and appearance.
- K. When finished surfaces are cut so that smooth transition with new Work is not possible, terminate existing surface along straight line at natural line of division and submit recommendation to Architect for review.

- L. Where change of plane of 1/4 inch or more occurs, submit recommendation for providing smooth transition to Architect for review.
- M. Trim existing doors to clear new floor finish. Refinish trim to original condition.
- N. Patch or replace portions of existing surfaces which are damaged, lifted, discolored, or showing other imperfections.
- O. Finish surfaces as specified in individual product sections.

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. General Requirement for Recycling.
 - 2. Construction waste management plan.
 - 3. Construction waste recycling.

1.2 WASTE MANAGEMENT GOALS

- A. The Owner desires that this project generate the least amount of waste possible and that the Contractor employ processes to minimize the generation of waste due to error, poor planning, breakage, mishandling, contamination, or other factors.
- B. Of the waste material that is generated, as much as economically feasible shall be reused, salvaged, or recycled.
 - 1. Recycle and/or salvage at least 75% of the non-hazardous construction and demolition debris.

1.3 GENERAL REQUIREMENTS FOR RECYCLING

- A. The General Contractor shall be responsible for:
 - 1. Sorting, segregating, recycling, and placing designated waste materials into containers, and for disposing of all unacceptable and dangerous wastes as defined below.
 - 2. Furnish waste and recycle collection containers, service those containers, and dispose of solid waste from the project, including unacceptable and dangerous waste.
 - 3. Maintain recycling and adaptive reuse storage and collection area in orderly arrangement with materials clearly separated to eliminate co-mingling of unsuitable materials.
- B. Waste which is disposed of by the General Contractor shall be in accordance with all applicable local, state and federal regulations, including WAC 173-350, Solid Waste Handling Standards and WAC 173-303, Dangerous Waste Regulations and ORS 466.100 Disposal of waste restricted.
 - 1. Onsite recycling bins shall be well marked and easily distinguishable from waste bins. Each recycle bin shall be marked according to its contents.

1.4 PLAN REQUIREMENTS

- A. Develop and implement construction waste management plan as approved by Architect/Engineer.
- B. Intent:

1. Divert construction, demolition, and land-clearing debris from landfill disposal.
2. Redirect recyclable material back to manufacturing process.
3. Generate cost savings or increase minimal additional cost to Project for waste disposal.

1.5 SUBMITTALS

- A. Section 013300 - Submittal Procedures contains requirements for submittals.
- B. Construction Waste Management Plan: Submit construction waste management plan describing methods and procedures for implementation and monitoring compliance including the following:
 1. Transportation company hauling construction waste to waste processing facilities.
 2. Recycling and adaptive reuse processing facilities and waste type each facility will accept.
 3. Construction waste materials anticipated for recycling and adaptive reuse.
 4. On-Site sorting and Site storage methods.
- C. Submit documentation prior to Substantial Completion substantiating construction waste management plan was maintained and goals were achieved.
 1. Trash: Quantity by weight deposited in landfills. Include associated fees, transportation costs, container rentals, and taxes for total cost of disposal.
 2. Salvaged Material: Quantity by weight with destination for each type of material salvaged for resale, recycling, or adaptive reuse. Include associated fees, transportation costs, container rentals, taxes for total cost of disposal, and reimbursements due to salvage resale.
 3. Total Cost: Indicate total cost or savings for implementation of construction waste management plan.

1.6 CONSTRUCTION WASTE MANAGEMENT PLAN

- A. Construction Waste Landfill Diversion: Minimum 75 percent by weight of construction waste materials for duration of Project through resale, recycling, or adaptive reuse.
- B. Implement construction waste management plan at start of construction.
- C. Distribute approved construction waste management plan to Subcontractors and others affected by plan requirements.
- D. Oversee plan implementation, instruct construction personnel for plan compliance, and document plan results.
- E. Dangerous Waste Management:

1. Dangerous waste generated during the project shall be identified, accumulated and disposed in accordance with WAC 173-303. General Contractor generated dangerous waste must be shipped for disposal within 90 days of generation.
 2. General Contractor may accumulate dangerous waste in accordance with WAC 173-303 and Washington Department of Ecology Technical Information Memorandum 94-120, Satellite Accumulation (<http://www.ecy.wa.gov/pubs/94120.pdf>). If General Contractor accumulates dangerous waste in greater volume than 55 gal or acutely hazardous waste in greater volume than one quart, General Contractor shall establish and operate a "90-day" accumulation area in accordance with WAC 173-303.
 3. General Contractor shall dispose dangerous waste only through vendor(s) approved by owner. General Contractor shall arrange all dangerous waste shipments. Utilization of the vendor and facilities included in the State of Washington Hazardous Waste Disposal contract is authorized. Any other proposed vendor(s) and/or facilities are subject to audit by owner, prior to utilization. General Contractor shall pay for said audits.
- F. Purchase products to prevent waste by:
1. Ensuring correct quantity of each material is delivered to Site.
 2. Choosing products with minimal or no packaging.
 3. Requiring suppliers to use returnable pallets or containers.
 4. Requiring suppliers to take or buy back rejected or unused items.
- G. Resources for Development of a Waste Management Plan: The following resource is available to assist in developing a waste management plan.
1. <http://your.kingcounty.gov/solidwaste/greenbuilding/specifications-plans.asp>

1.7 CONSTRUCTION WASTE RECYCLING

- A. Use source separation method or comingling method suitable to sorting and processing method of selected recycling center. Dispose nonrecyclable trash separately into landfill.
- B. Source Separation Method: Recyclable materials separated from trash and sorted into separate bins or containers, identified by waste type, prior to transportation to recycling center.
- C. Comingling Method: Recyclable materials separated from trash and placed in unsorted bins or container for sorting at recycling center.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 WASTE MANAGEMENT PLAN IMPLEMENTATION

- A. Manager: Designate an on-site person or persons responsible for instructing workers and overseeing and documenting results of the Waste Management Plan.
- B. Communication: Distribute copies of the Waste Management Plan to job site foreman, each subcontractor, Owner, and Architect.
- C. Instruction: Provide on-site instruction of appropriate separation, handling, and recycling, salvage, reuse, and return methods to be used by all parties at the appropriate stages of the project.
- D. Meetings: Discuss trash/waste management goals and issues at project meetings.
 - 1. Pre-bid meeting.
 - 2. Pre-construction meeting.
 - 3. Regular job-site meetings.

3.2 CONSTRUCTION WASTE COLLECTION

- A. Collect construction waste materials in marked bins or containers and arrange for transportation to recycling centers or adaptive salvage and reuse processing facilities.
- B. Maintain recycling and adaptive reuse storage and collection area in orderly arrangement with materials separated to eliminate co-mingling of materials required to be delivered separately to waste processing facility.
- C. Store construction waste materials to prevent environmental pollution, fire hazards, hazards to persons and property, and contamination of stored materials.
- D. Cover construction waste materials subject to disintegration, evaporation, settling, or runoff to prevent polluting air, water, and soil.

3.3 CONSTRUCTION WASTE DISPOSAL

- A. Deliver construction waste to waste processing facilities. Obtain receipt for deliveries.
- B. Dispose of construction waste not capable of being recycled or adaptively reused by delivery to landfill, incinerator, or other legal disposal facility. Obtain receipt for deliveries.

3.4 SITE MAINTENANCE

- A. Do not use the Owner's waste containers for construction waste.

- B. Dispose daily of flammable, hazardous and toxic waste materials. Dispose of trash and debris in compliance with governing codes, ordinances, regulations and anti-pollution laws.
- C. Locate dumpster(s) at a site designated by the Owner.

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Closeout procedures.
- B. Demonstration and instructions.
- C. Operation and maintenance data.
- D. Manual for equipment and systems.
- E. Spare parts and maintenance products.
- F. Product warranties and product bonds.
- G. Final cleaning.

1.2 CLOSEOUT PROCEDURES

- A. Prerequisites to Substantial Completion: Complete following items before requesting Certification of Substantial Completion, either for entire Work or for portions of Work:
 - 1. Submit maintenance manuals, Project record documents, digital images of construction photographs and other similar final record data in compliance with this Section.
 - 2. Complete facility startup, testing, adjusting, balancing of systems and equipment, demonstrations and instructions to Owner's operating and maintenance personnel as specified in compliance Contract Documents.
 - 3. Conduct inspection to establish basis for request that Work is substantially complete. Create comprehensive list (initial punch list) indicating items to be completed or corrected, value of incomplete or nonconforming Work, reason for being incomplete, and date of anticipated completion for each item. Include copy of list with request for Certificate of Substantial Completion.
 - 4. Obtain and submit releases enabling Owner's full, unrestricted use of Project and access to services and utilities. Include certificate of occupancy, operating certificates, and similar releases from authorities having jurisdiction and utility companies.
 - 5. Insurance: Advise Owner of insurance change-over requirements.
 - 6. Deliver tools, spare parts, extra stocks of material, and similar physical items to Owner.
 - 7. Make final change-over of locks and transmit keys directly to Owner. Advise Owner's personnel of change-over in security provisions.
 - 8. Discontinue or change over and remove temporary facilities and services from Project Site, along with construction tools, mockups, and similar elements.

9. Perform final cleaning according to this Section.
- B. Substantial Completion Inspection:
1. When Contractor considers Work to be substantially complete, submit to Architect/Engineer:
 - a. Written certificate that Work, or designated portion, is substantially complete.
 - b. List of items to be completed or corrected (initial punch list).
 2. Within seven days after receipt of request for Substantial Completion, Architect/Engineer will make inspection to determine whether Work or designated portion is substantially complete.
 3. Should Architect/Engineer determine that Work is not substantially complete:
 - a. Architect/Engineer will promptly notify Contractor in writing, stating reasons for its opinion.
 - b. Contractor shall remedy deficiencies in Work and send second written request for Substantial Completion to Architect/Engineer.
 - c. Architect/Engineer will re-inspect Work.
 - d. Redo and Inspection of Deficient Work: Repeated until Work passes Architect/Engineer's inspection.
 4. When Architect/Engineer finds that Work is substantially complete, Architect/Engineer will:
 - a. Prepare Certificate of Substantial Completion on AIA G704 - Certificate of Substantial Completion, accompanied by Contractor's list of items to be completed or corrected as verified and amended by Architect/Engineer and Owner (final punch list).
 - b. Submit Certificate to Owner and Contractor for their written acceptance of responsibilities assigned to them in Certificate.
 5. After Work is substantially complete, Contractor shall:
 - a. Allow Owner occupancy of Project under provisions stated in Certificate of Substantial Completion.
 - b. Complete Work listed for completion or correction within time period stipulated.
 6. Owner will occupy portions of building as specified in Section 011000 - Summary.
- C. Prerequisites for Final Completion: Complete following items before requesting final acceptance and final payment.
1. When Contractor considers Work to be complete, submit certification that:
 - a. Contract Documents have been reviewed.

- b. Work has been examined for compliance with Contract Documents.
 - c. Work has been completed according to Contract Documents.
 - d. Work is completed and ready for final inspection.
 - 2. Submittals: Submit following:
 - a. Final punch list indicating all items have been completed or corrected.
 - b. Final payment request with final releases and supporting documentation not previously submitted and accepted. Include certificates of insurance for products and completed operations where required.
 - c. Specified warranties, workmanship/maintenance bonds, maintenance agreements, and other similar documents.
 - d. Accounting statement for final changes to Contract Sum.
 - e. Contractor's affidavit of payment of debts and claims on AIA G706 - Contractor's Affidavit of Payment of Debts and Claims.
 - f. Contractor affidavit of release of liens on AIA G706A - Contractor's Affidavit of Release of Liens.
 - g. Consent of surety to final payment on AIA G707 - Consent of Surety to Final Payment Form.
 - h. Other Submittals Not Listed: Submit as required by State and Local agencies, Agreement, and Contracting Requirements.
 - 3. Perform final cleaning for Contractor-soiled areas according to this Section.
- D. Final Completion Inspection:
- 1. Within seven days after receipt of request for final inspection, Architect/Engineer will make inspection to determine whether Work or designated portion is complete.
 - 2. Should Architect/Engineer consider Work to be incomplete or defective:
 - a. Architect/Engineer will promptly notify Contractor in writing, listing incomplete or defective Work.
 - b. Contractor shall remedy stated deficiencies and send second written request to Architect/Engineer that Work is complete.
 - c. Architect/Engineer will re-inspect Work.
 - d. Redo and Inspection of Deficient Work: Repeated until Work passes Architect/Engineer's inspection.

- E. Following determination that Work is complete, Owner's Representative and Architect will make recommendation to Owner for acceptance of Final Acceptance of Work.
- F. Owner's Representative will issue Final Acceptance letter after determination that requirements for Final Completion have been fulfilled.
- G. Should Owner's Representative and Architect be required to perform more than two reviews for Substantial Completion or Final Completion, due to failure of the Work to conform to completion status claimed by Contractor:
 - 1. Contractor will compensate Owner's Representative and Architect on a time and expense basis at customary hourly rate for each additional review.
 - 2. Compensation will be deducted from Contractor's Final Progress Payment.

1.3 DEMONSTRATION AND INSTRUCTIONS

- A. The Contractor must train Owner maintenance personnel in the operation and maintenance of mechanical and electrical equipment and other products identified in Contract Documents. Coordination must be maintained with systems designers for developing the hours of instruction and scope of material to be covered. Training of Owner personnel must not begin until the Architect has approved the final submittal copy of the Operation and Maintenance Manual.
- B. Demonstrate Project equipment instructed by qualified representative who is knowledgeable about the Project.
- C. Video Recordings: Provide high-quality color video recordings of demonstration and instructional sessions. Engage approved videographer to record sessions. Include classroom instructions, demonstrations, board diagrams, and other visual aids.
- D. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.
- E. Use operation and maintenance manuals as basis for instruction. Review contents of manual with Owner's personnel in detail to explain all aspects of operation and maintenance.
- F. Demonstrate startup, operation, control, adjustment, troubleshooting, servicing, maintenance, and shutdown of each item of equipment at agreed time, at designated location.
- G. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.
- H. Required instruction time for each item of equipment and system is specified in individual Specification Sections.
- I. At each training session, provide a sign-in sheet for signature of all Owner staff in attendance. Identify the sign-in sheet with the training being provided and the date of the training. Submit the sign-in sheet(s) before Final Acceptance.

1.4 OPERATION AND MAINTENANCE DATA

- A. Submit PDF copy of preliminary draft prior to Substantial Completion. Architect/Engineer will review draft and return one copy with comments. Revise content of document sets as required prior to final submission.
- B. Submit final copy in PDF composite electronic indexed file at Substantial Completion.
- C. Prepare media cover with printed title "OPERATION AND MAINTENANCE INSTRUCTIONS," title of Project.
- D. Internally subdivide media contents with permanent page dividers, logically organized as described below.
- E. Drawings: Provide scalable PDF copies in media requested.
- F. Contents: Prepare table of contents for media, with each product or system description identified, in three parts as follows:
 - 1. Part 1: Directory, listing names, addresses, and telephone numbers of Architect/Engineer, Contractor, Subcontractors, and major equipment suppliers.
 - 2. Part 2: Operation and maintenance instructions, arranged by Section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Include the following:
 - a. Significant design criteria.
 - b. List of equipment.
 - c. Parts list for each component.
 - d. Operating instructions.
 - e. Maintenance instructions for equipment and systems.
 - f. Maintenance instructions for finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
 - g. Safety precautions to be taken when operating and maintaining or working near equipment.
 - 3. Part 3: Project documents and certificates, including the following:
 - a. Shop Drawings and product data.
 - 1) Air and water balance reports.
 - b. Certificates.

- c. PDF copies of warranties and bonds. Deliver original to Owner in separate bound folder in CSI format.

1.5 SPARE PARTS AND MAINTENANCE PRODUCTS

- A. Furnish spare parts, maintenance, and extra products in quantities specified in individual Specification Sections.
- B. Deliver to place in location as directed by Owner; obtain receipt prior to final payment.

1.6 PRODUCT WARRANTIES

- A. Obtain warranties and bonds executed by responsible Subcontractors, suppliers and manufacturers within ten days after completion of applicable item of Work.
- B. Execute and assemble transferable warranty documents and bonds from Subcontractors, suppliers, and manufacturers.
- C. Verify documents are in proper form, contain full information and are notarized.
- D. Co-execute submittals when required.
- E. Include table of contents and assemble in three D side ring binder with durable plastic cover. Maintain a PDF copy for O&M manual at project closeout.
- F. Submit prior to final Application for Payment.
- G. Warranties shall be dated for length of time specified from date of Substantial Completion and will be rejected if dated otherwise.
- H. Time of Submittals:
 - 1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within ten days after acceptance.
 - 2. Make other submittals within ten days after date of Substantial Completion, prior to final Application for Payment.
 - 3. For items of Work for which acceptance is delayed beyond Substantial Completion, submit within ten days after acceptance, listing date of acceptance as beginning of warranty or bond period.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 FINAL CLEANING

- A. Execute final cleaning prior to final Project assessment.

1. Employ experienced personnel or professional cleaning firm.
- B. Clean equipment and fixtures to sanitary condition with appropriate cleaning materials.
- C. Replace filters of operating equipment.
- D. Clean Site; sweep paved areas, rake clean landscaped surfaces.
- E. Remove waste and surplus materials, rubbish, and construction facilities from Site.

3.2 FINAL ADJUSTMENT OF ACCOUNTS

- A. Submit final accounting statement to Architect making final adjustments to original Contract Sum.
- B. Indicate Original Contract Sum and determine Total Adjusted Contract Sum from additions and deductions resulting from previous Change Orders, Alternates, Unit prices, and other adjustments.
- C. Deduct previous payments from adjusted Contract Sum to determine Total Contract Sum remaining due.
- D. Architect will prepare final Change Order reflecting approved adjustments to Contract Sum not previously made by other Change Orders.

3.3 FINAL APPLICATION FOR PAYMENT

- A. Submit final Application for Payment in accordance with the Contracting Requirements, and procedures and requirements of Owner, identifying total adjusted Contract Sum, previous payments, and sum remaining due.

END OF SECTION

DIVISION 02
EXISTING CONDITIONS

PART 1 GENERAL

1.1 SUMMARY

A. Section includes

1. Selective demolition of building elements for alteration purposes.
 - a. Demolishing designated building equipment and fixtures.
 - b. Demolishing designated construction.
 - c. Cutting and alterations for completion of the Work.
 - d. Removing designated items for reuse or Owner's retention.
 - e. Protecting items designated to remain.
 - f. Removing demolished materials.

1.2 REFERENCE STANDARDS

- A. 29 CFR 1926 - Safety and Health Regulations for Construction; Current Edition.
- B. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations; 2022, with Errata (2021).

1.3 SUBMITTALS

- A. See Section 013300 for submittal procedures.
- B. Demolition Plan: Submit demolition plan as required by OSHA and local AHJs.
 1. Indicate extent of demolition, removal sequencing, bracing and shoring, and location and construction of barricades and fences.
 2. Revise as necessary after review by A/E and Owner. Do not proceed until approved plan is received.
- C. Project Record Documents: Accurately record actual locations of capped and active utilities and subsurface construction.

1.4 QUALITY ASSURANCE

- A. Demolition Firm Qualifications: Company specializing in the type of work required.
 1. Minimum of 3 years of documented experience on projects of similar size, complexity and scope and with service facilities within 50 miles of Project.

1.5 PROJECT CONDITIONS

- A. The Contractor is responsible for the safety of his workmen and shall follow all WISHA rules and regulations. The Contractor shall provide respirators when recommended or required.
- B. Conduct demolition to minimize interference with adjacent buildings that are to remain in operation.
- C. Notify Architect/Engineer immediately if existing conditions differ from shown on construction documents.

1.6 SCHEDULING

- A. Section 013216 - Construction Progress Schedule: Requirements for scheduling.
- B. Schedule Work to coincide with new construction.
- C. Cooperate with Owner in scheduling noisy operations and waste removal that may impact Owners operation and activities in adjoining spaces.
- D. Coordinate utility and building service interruptions with Owner.
 - 1. Do not disable or disrupt building fire or life safety systems without three days prior written notice to Owner and AHJ.
 - 2. Schedule tie-ins to existing systems to minimize disruption.
 - 3. Coordinate Work to ensure fire sprinklers, fire alarms, smoke detectors, emergency lighting, exit signs and other life safety systems remain in full operation in occupied areas.

1.7 PRE-DEMOLITION MEETINGS

- A. Section 013113 - Project Meetings.
- B. Convene minimum one week prior to commencing work of this section.
- C. Review with Owner's Representative and building occupants the approved Demolition Schedule. Discuss closures, shutdowns and operational impacts.

PART 2 PRODUCTS -- NOT USED

2.1 PATCHING MATERIALS

- A. New Materials: Match existing products and work for patching and extending work.
- B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.

PART 3 EXECUTION

3.1 GENERAL PROCEDURES AND PROJECT CONDITIONS

- A. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
 - 1. Obtain required permits.
 - 2. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.
 - 3. Provide, erect, and maintain temporary barriers and security devices.
 - 4. Conduct operations to minimize effects on and interference with adjacent structures and occupants and owner's other operations within the building.
 - 5. Do not close or obstruct roadways or sidewalks without permits from authority having jurisdiction.
 - 6. Conduct operations to minimize obstruction of public and private entrances and exits. Do not obstruct required exits at any time. Protect persons using entrances and exits from removal operations.
- B. Do not begin removal until receipt of notification to proceed from Owner.
- C. Protect existing structures and other elements to remain in place and not removed.
- D. Minimize production of dust due to demolition operations. Do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.
- E. Perform demolition in a manner that maximizes salvage and recycling of materials.
 - 1. Dismantle existing construction and separate materials.
 - 2. Set aside reusable, recyclable, and salvageable materials; store and deliver to collection point or point of reuse.
- F. Do not burn or bury materials on site. Leave site in clean condition.

3.2 EXISTING UTILITIES

- A. Coordinate work with utility companies. Notify utilities before starting work, comply with their requirements, and obtain required permits.
- B. Protect existing utilities to remain from damage.
- C. Do not disrupt public utilities without permit from authority having jurisdiction.

- D. Do not close, shut off, or disrupt existing life safety systems that are in use without at least 7 days prior written notification to Owner.
- E. Locate and mark utilities to remain; mark using highly visible tags or flags, with identification of utility type; protect from damage due to subsequent construction, using substantial barricades if necessary.

3.3 SELECTIVE DEMOLITION FOR ALTERATIONS

- A. Existing construction and utilities indicated on drawings are based on casual field observation and existing record documents only.
 - 1. Verify construction and utility arrangements are as indicated.
 - 2. Report discrepancies to Integrus Architecture before disturbing existing installation.
 - 3. Beginning of demolition work constitutes acceptance of existing conditions that would be apparent upon examination prior to starting demolition.
- B. Separate areas in which demolition is being conducted from areas that remain occupied.
 - 1. Provide, erect, and maintain temporary dustproof partitions of construction.
- C. Maintain weatherproof exterior building enclosure, except for interruptions required for replacement or modifications; prevent water and humidity damage.
- D. Remove existing work as indicated and required to accomplish new work.
 - 1. Remove items indicated on drawings.
- E. Services including, but not limited to, HVAC and Electrical:
 - 1. Maintain existing active systems to remain in operation, and maintain access to equipment and operational components.
 - 2. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
- F. Protect existing work to remain.
 - 1. Prevent movement of structure. Provide shoring and bracing as required.
 - 2. Perform cutting to accomplish removal work neatly and as specified for cutting new work.
 - 3. Repair adjacent construction and finishes damaged during removal work.
 - 4. Patch to match new work.
- G. Provide appropriate temporary signage, including signage for exit or building egress.

- H. Do not close or obstruct building egress path.
- I. Do not disable or disrupt building fire or life safety systems without [3] days prior written notice to Owner.

3.4 SALVAGE REQUIREMENTS

- A. Coordinate with Owner to identify building components and equipment required to be removed and delivered to Owner.
- B. Tag components and equipment Owner designates for salvage.
- C. Protect designated salvage items from demolition operations until items can be removed.
- D. Carefully remove building components and equipment indicated to be salvaged or re-used.
- E. Disassemble as required to permit removal from building.
- F. Package small and loose parts to avoid loss.
- G. Mark equipment and packaged parts to permit identification and consolidation of components of each salvaged item.
- H. Prepare assembly instructions consistent with disassembled parts. Package assembly instructions in protective envelope and securely attach to each disassembled salvaged item.
- I. Deliver salvaged items to Owner. Obtain signed receipt from Owner.

3.5 DEBRIS AND WASTE REMOVAL

- A. Remove debris, junk, and trash from site.
- B. Remove materials not to be reused on site; comply with requirements of Section 017419 - Waste Management.
- C. Leave site in clean condition, ready for subsequent work.
- D. Clean up spillage and wind-blown debris from public and private lands.
- E. Remove temporary Work.

END OF SECTION

DIVISION 03

CONCRETE

PART 1 GENERAL

1.1 SUMMARY

- A. Provide plant-mixed cast in place concrete.
- B. Repair existing concrete work as required for upgrade.

1.2 SUBMITTALS

- A. Provide product data, shop drawings, mix design and test reports.

1.3 QUALITY ASSURANCE

- A. Perform Work in accordance with ACI 301.

PART 2 PRODUCTS

2.1 CONCRETE MATERIALS

- A. Cement: ASTM C150, Type I - Normal Portland type. Type II - Moderate Portland type.
- B. Blended Cement: ASTM C595; Blended cements are permitted to be used in lieu of ASTM C150 cement if all requirements for fly ash, slag, pozzolans and cement are met. Color to be selected.
- C. Fine and Coarse Aggregates: ASTM C33. No iron aggregates allowed in concrete.
- D. Water: Comply with ASTM C1602.
- E. Fly Ash: ASTM C618, Class F.
- F. Slag for Cement: ASTM C989.

2.2 REINFORCING MATERIALS

- A. Reinforcing Bars: ASTM A 615 or A 706, Grade 60, deformed.
- B. Steel Wire: ASTM A 82.
- C. Steel Wire Fabric: ASTM A 185, welded.
- D. Steel Wire Fabric: ASTM A 497, welded, deformed.

2.3 FORMWORK

- A. Plywood or metal panel formwork sufficient for structural and visual requirements.

2.4 ADMIXTURES

- A. Acceptable Manufacturers:

1. Euclid.
 2. GCP Applied Technologies.
 3. Sika.
 4. Substitutions: Section 012500 - Substitution Procedures.
- B. All admixtures shall be from the same manufacturer to ensure compatibility.
- C. Prohibited Admixtures: Calcium chloride, thiocyanate or admixtures containing more than 0.05% chloride ions are not permitted.
- D. Shrinkage-Reducing Admixture: Conforming to ASTM C494, Type S.
- E. Air Entrainment: ASTM C260. Certified by manufacturer to be compatible with other admixtures.
- F. Water Reducing Admixture: Conforming to ASTM C494, Type A shall contain no chlorides (not more than 0.05 percent). The amount of admixture added to the concrete shall be in accordance with the manufacturer's recommendations to obtain between 5% and 10% water reduction.
- G. Water Reducing, Retarding Admixture: Conforming to ASTM C494, Type D and not containing more chloride ions than are present in municipal drinking water.
- H. High Range Water Reducing Admixture (Superplasticizer): Conforming to ASTM C494 type F or G. The admixture shall be free of chlorides and alkalis. Use a third generation superplasticizer which shall be job site added in measured container, extended plastic-flow time, maintain setting characteristics similar to normal concrete throughout its recommended dosage range at varying concrete temperatures, reduce water 30 to 40 percent, give high early and ultimate strengths.

2.5 ACCESSORIES

- A. Bonding Agent for Concrete to Concrete:
1. W.R. Meadows: Intralok or Acry-lok Bonding Agent.
 2. Euclid Chemical Co. Product: SBR Latex.
 3. Larsen Product Co.: Weldcrete.
 4. L&M Construction Materials Product: Everbond.
 5. GCP Applied Technologies: Daraweld.
 6. Substitutions: Under provision of Section 012500 - Substitution Procedures.
- B. Water-Based Acrylic Membrane Curing Compound: ASTM C 309, Type 1, Class B.
- C. Reglets: Galvanized sheet steel reglets, minimum 26 gage (.018 inch).

- D. Waterstops: Rubber or PVC waterstops.
- E. Epoxy Adhesive: ASTM C 881, two-component material.
- F. Screw Anchors:
 - 1. Simpson Strong Tie-Co.; Titen HD.
 - 2. DeWalt Screw Bolt+.
 - 3. Hilti, Inc.; HUS-HR.
 - 4. Use subject to approval by ICC
- G. Epoxy Anchors:
 - 1. Simpson Strong Tie Co.; Strong-Bolt 2
 - 2. DeWalt - Power-Stud + SD2
 - 3. Hilti; Kwik Bolts T-Z.
 - 4. Use subject to approval by ICC
- H. Adhesive Anchors:
 - 1. Simpson Strong Tie; "SET- 3G Epoxy"
 - 2. DeWalt, "Pure110+"
 - 3. Hilti; "Hit-RE 500-V3"
 - 4. Use subject to approval by ICC
 - 5. For applications in temperatures below what is set by the Manufacturer use Cold Weather Adhesive Anchor per manufacturers requirements

2.6 CONCRETE MIX

- A. Provide concrete to meet all requirements shown on the drawings. The contractor is responsible for the preparation of design mixtures for each class of concrete used in construction.
- B. Select proportions for normal weight concrete in accordance with ACI 301 using the method of trial mixes.
- C. Calcium chloride not allowed in concrete.
- D. Ready Mixed Concrete: Mix and deliver concrete in accordance with ASTM C94/C94M.

PART 3 EXECUTION

3.1 GENERAL

- A. Perform work in accordance with ACI 301.
- B. Provide Concrete Finishes For Formed Surfaces:
 - 1. Surfaces Not Exposed To View: As-cast form finish.
 - 2. Surfaces Exposed To View: Smooth form.
- C. Provide Concrete Finishes for Monolithic Slabs:
 - 1. Scratch finish for surfaces to receive concrete floor topping or mortar setting bed.
 - 2. Trowel finish for surfaces to be exposed to view or covered with resilient flooring, carpet, tile, or other thin finish system.

END OF SECTION

DIVISION 05

METALS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes
 - 1. Shop fabricated steel and aluminum items.
 - 2. Structural supports for miscellaneous attachments.

1.2 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Requirements for submittals.
- B. Code compliance data.

1.3 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Inspection: Accept metal fabrications on-Site in labeled shipments. Inspect for damage.
- C. Protect metal fabrications from damage by exposure to weather or by ground contact.

1.4 EXISTING CONDITIONS

- A. Field Measurements: Verify field measurements prior to fabrication. Indicate field measurements on Shop Drawings.

PART 2 PRODUCTS

2.1 MATERIALS - STEEL

- A. Steel Sections, Channels and Angles: ASTM A36/A36M.
- B. Plates: ASTM A572; Grade 50.
- C. Pipe: ASTM A53/A53M, Grade B Schedule 40, black finish.
- D. Structural W-Shapes: ASTM A992.
- E. Sheet Steel: ASTM A653, Grade 33 Structural Quality.
- F. Bolts: ASTM A307; Grade A or B F3125/F3125M; Type 1.
- G. Nuts: ASTM A563 heavy hex type.
- H. Washers: ASTM F436; Type 1.

- I. Mechanical Fasteners: Same material as or compatible with materials being fastened; type consistent with design and specified quality level.
- J. Bolts, Nuts, and Washers for Equipment and Piping:
 - 1. Carbon Steel
 - a. Structural Connections: ASTM A307, Grade A or B, hot-dip galvanized.
 - b. Anchor Bolts: ASTM A36, hot-dip galvanized.
 - c. Pipe and Equipment Flange Bolts: ASTM A193, Grade B-7.
 - 2. Stainless Steel: Type 316 stainless steel, class 2; ASTM A193 for bolts; ASTM A194 for nuts.
- K. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.
- L. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.
- M. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

2.2 MATERIALS - ALUMINUM

- A. Extruded Aluminum: ASTM B221 (ASTM B221M), 6063 alloy, T6 temper.
- B. Sheet Aluminum: ASTM B209/B209M, 5052 alloy, H32 or H22 temper.
- C. Bolts, Nuts, and Washers: Stainless steel.
- D. Welding Materials: AWS D1.2/D1.2M; type required for materials being welded.

2.3 FABRICATION

- A. Fit and shop assemble items in largest practical sections, for delivery to site.
- B. Fabricate items with joints tightly fitted and secured.
- C. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
- D. Furnish components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.4 FINISHES - STEEL

- A. Steel:
 - 1. Clean surfaces of rust, scale, grease and foreign matter prior to finishing.

2. Do not prime surfaces in direct contact with concrete or where field welding is required.
3. Prime paint items with one coat except where galvanizing is specified.
4. Galvanizing: ASTM A123; hot-dip galvanize after fabrication.
5. Galvanizing for Fasteners, Connectors, and Anchors:
 - a. Hot-Dip Galvanizing: ASTM A153.
 - b. Mechanical Galvanizing: ASTM B695; Class 50 minimum.
6. Sheet Steel: Galvanized with G90 coating class.
7. Bolts: Hot-dip galvanized.
8. Nuts: Hot-dip galvanized.
9. Washers: Hot-dip galvanized.
10. Shop Primer: SSPC Paint 15, Type 1, red oxide.
11. Touch-Up Primer for Galvanized Surfaces: SSPC Paint 20 Type I Inorganic or Type II Organic.

2.5 FINISHES - ALUMINUM

- A. Class I Natural Anodized Finish: AAMA 611 AA-M12C22A41 Clear anodic coating not less than 0.7 mils thick.
- B. Apply one coat of bituminous paint to concealed aluminum surfaces in contact with cementitious or dissimilar materials.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.

3.2 INSTALLATION

- A. Install items plumb and level, accurately fitted, free from distortion or defects.
- B. Obtain approval prior to site cutting or making adjustments not scheduled.

3.3 TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch.

C. Maximum Out-of-Position: 1/4 inch.

END OF SECTION

DIVISION 06
WOOD, PLASTICS, AND COMPOSITES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Wood panel products.
2. Lumber products.
3. Miscellaneous framing and sheathing.
4. Concealed wood blocking.
5. Fasteners and Anchors.
6. Accessories.
7. Factory wood treatment.

1.2 REFERENCES

A. American Wood Protection Association:

1. AWPA U1 - Use Category System: User Specification for Treated Wood.

B. APA - The Engineered Wood Association:

1. APA - Plywood Design Specification, including supplements.
2. APA AFG-01 - Adhesives for Field-Gluing Plywood to Wood Framing.

C. APA PS 1 - Voluntary Product Standard - Structural Plywood

D. American Society for Testing and Materials:

1. ASTM A123/A123M - Standard Specification for Zinc (Hot Dip Galvanized) coatings on Iron and Steel Products.
2. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot Dip) on Iron and Steel Hardware.
3. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc Iron Alloy-Coated (Galvannealed) by the Hot Dip Process.
4. ASTM B695 - Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel
5. ASTM D226/D226M - Standard Specification for Asphalt Saturated Organic Felt Used in Roofing and Waterproofing.

6. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
 7. ASTM E119/E119M - Standard Test Methods for Fire Tests of Building Construction and Materials.
 8. ASTM F1667/F1667M - Standard Specification for Driven Fasteners: Nails, Spikes, and Staples.
- E. National Fire Protection Association:
1. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials.
- F. Underwriters Laboratories Inc.:
1. UL 723 - Tests for Surface Burning Characteristics of Building Materials.
- G. U.S. Department of Commerce - National Institute of Standards and Technology:
1. DOC PS 1 - Structural Plywood.
 2. DOC PS 2 - Performance Standard for Wood-Based Structural-Use Panels.
 3. DOC PS 20 - American Softwood Lumber Standard.

1.3 COORDINATION

- A. Section 013000 - Administrative Requirements: Requirements for coordination.

1.4 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit technical data on wood preservative materials, and application instructions.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with the following:
1. Lumber Grading Agency: Certified by DOC PS 20.
 2. Wood Structural Panel Grading Agency: Certified by APA - The Engineered Wood Association.
- B. Fire Rated Wall Construction: Rating as indicated on Drawings.
1. Tested Rating: Determined in accordance with ASTM E119.
- C. Surface Burning Characteristics:
1. Fire Retardant Treated Materials: Maximum 25/450 flame spread/smoke developed index when tested in accordance with ASTM E84.

- D. Apply label from agency approved by authority having jurisdiction to identify each fire retardant treated material.
- E. Perform Work in accordance with IBC standards.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 - Product Requirements: Product storage and handling requirements.

PART 2 PRODUCTS

2.1 DESIGN REQUIREMENTS

- A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
 - 1. Species: Douglas Fir-Larch, unless otherwise indicated.
 - 2. If no species is specified, provide any species graded by the agency specified; if no grading agency is specified, provide lumber graded by any grading agency meeting the specified requirements.
 - 3. Grading Agency: Any grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee (www.alsc.org) and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.
 - 4. Lumber of other species or grades is acceptable provided structural and appearance characteristics are equivalent to or better than products specified.
- B. Composite Wood Products: Meet emissions and content requirements of Composite Wood Evaluation.
 - 1. When using composite wood, provide materials that are NAF (No Added Formaldehyde) or ULEF (Ultra Low Emitting Formaldehyde).

2.2 LUMBER MATERIALS

- A. Non-structural Light Framing: Douglas Fir/Larch, No 2 and better, 19 percent maximum moisture content.
- B. Studding: Douglas Fir/Larch, No 2 and better, 19 percent maximum moisture content.
- C. Miscellaneous Framing and blocking: Douglas Fir/Larch, No 2 and better, 19 percent maximum moisture content, pressure preservative treat.

2.3 WOOD PANEL PRODUCTS

- A. APA Grade Stamp each panel. Conform to DOC PS 1 and DOC PS 2 for cross-laminated veneer panel.

1. APA PS 1, A-C Group 1, Exposure 1: Face exposed one side.
2. Where A side of face of plywood is left exposed as finish or room interior, ensure no wood stamp is present on face and no paint on sides.

2.4 FASTENERS AND ANCHORS

- A. Fasteners: ASTM A153/A153M, hot dipped galvanized or ASTM B695, Class 55 mechanically galvanized, 304 stainless steel for high humidity and treated wood locations, unfinished steel elsewhere.
- B. Nails: ASTM F1667.
- C. Anchors: Adhesive anchor with screen type for anchorage to hollow masonry. Expansion bolt and screw anchor type for anchorage to solid masonry or concrete. A307 Bolt, Self Drilling Screw or ballistic fastener for anchorages to steel. All material to be zinc coated or stainless steel.

2.5 FACTORY WOOD TREATMENT

- A. Wood Preservative (Pressure Treatment): AWWPA Treatment Use Category according to Service Conditions using water borne preservative with 0.25 percent retainage.
- B. Treat with wood preservative any wood to come in contact with concrete.
- C. Fire Retardant Treatment: Chemically treated and pressure impregnated, having flame spread of 25 or less when tested in accordance with ASTM E84 and showing no evidence of significant progressive combustion when test is continued for an additional 20 minute period, Interior Type.
- D. Moisture Content after Treatment: Kiln dried (KDAT).
 1. Lumber: Maximum 19 percent.
 2. Structural Panels: Maximum 15 percent.

PART 3 EXECUTION

3.1 INSTALLATION - GENERAL

- A. Select material sizes to minimize waste.
- B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.
- C. Where treated wood is used on interior, provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.

3.2 SITE APPLIED WOOD TREATMENT

- A. Apply preservative treatment.

- B. Brush apply one coat of preservative treatment on wood in contact with cementitious materials; roofing and related metal flashings. Treat site-sawn cuts.
- C. Allow preservative to dry prior to erecting members.

3.3 TOLERANCES

- A. Section 014000 - Quality Requirements: Tolerances.
- B. Framing Members: 1/4 inch from indicated position, maximum.

3.4 SCHEDULES

- A. Provide products of this section where detailed or indicated.

END OF SECTION

DIVISION 07

THERMAL AND MOISTURE PROTECTION

PART 1 GENERAL

1.1 SUMMARY

A. Section includes:

1. Firestopping and through-penetration protection system materials and accessories.

B. Related Sections:

1. Section 092116- Gypsum Board Assemblies: Gypsum board fireproofing.

1.2 REFERENCES

A. American Society for Testing and Materials:

1. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
2. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
3. ASTM E814 - Standard Test Method for Fire Tests of Through-Penetration Fire Stops.
4. ASTM E1966 - Standard Test Method for Fire-Resistive Joint Systems.

B. Intertek Testing Services (Warnock Hersey Listed):

1. WH - Certification Listings.

C. National Fire Protection Association:

1. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials.

D. Underwriters Laboratories Inc.:

1. ANSI/UL 723 - Tests for Surface Burning Characteristics of Building Materials.
2. ANSI/UL 1479 - Fire Tests of Through-Penetration Firestops.
3. ANSI/UL 2079 - Tests for Fire Resistance of Building Joint Systems.

1.3 DEFINITIONS

- A. Firestopping: Material or combination of materials used to retain integrity of fire-rated construction by maintaining an effective barrier against the spread of flame, smoke, and hot gases through penetrations in, or construction joints between, fire rated wall and floor assemblies.

1.4 SUBMITTALS

- A. Section 013300 - Submittal Procedures.

- B. Product Data: Submit data on product characteristics, performance and limitation criteria.

- C. Schedule: Submit schedule of opening locations and sizes, penetrating items, and required listed design numbers to seal openings to maintain fire resistance rating of adjacent assembly.
- D. Manufacturer's Installation Instructions: Submit preparation and installation instructions.
- E. Engineering Judgments: For conditions not covered by UL or WH listed designs, submit judgments by licensed professional engineer suitable for presentation to authority having jurisdiction for acceptance as meeting code fire protection requirements. Engineering judgment documents must follow requirements set forth by the International Firestop Council.

1.5 QUALITY ASSURANCE

- A. Through Penetration Firestopping of Non-Fire Rated Floor and Roof Assemblies: Materials to resist free passage of flame and products of combustion.
 - 1. Noncombustible Penetrating Items: Noncombustible materials for penetrating items connecting maximum of three stories.
 - 2. Penetrating Items: Materials approved by authorities having jurisdiction for penetrating items connecting maximum of two stories.
- B. Surface Burning Characteristics: Maximum 25/450 flame spread/smoke developed index when tested in accordance with ASTM E84, NFPA 255, or UL 723.
- C. Pre-Installation Meetings:
 - 1. Convene one week prior to commencing work of this section, under provisions of Section 013119 - Project Meetings.
- D. Qualifications:
 - 1. Manufacturer: Company specializing in manufacturing products specified in this section with minimum five years documented experience.
 - 2. Installer: Company specializing in performing Work of this section with minimum five years documented experience, and approved by manufacturer.
- E. Mockup:
 - 1. Section 014000 - Quality Requirements: Requirements for mockup.
 - 2. Apply 3 linear ft of each type of linear firestopping material to representative substrate surface.
 - 3. Apply one of each unit type of firestopping material, such as penetrations through fire rated partition, to representative application.
 - 4. Locate where directed by Architect/Engineer.
 - 5. Incorporate accepted mockup as part of Work.

1.6 ENVIRONMENTAL REQUIREMENTS

- A. Section 016000 - Product Requirements.
- B. Do not apply materials when temperature of substrate material and ambient air is below 60 degrees F.
- C. Maintain this minimum temperature before, during, and for minimum 3 days after installation of materials.
- D. Provide ventilation in areas to receive solvent cured materials.

PART 2 PRODUCTS

2.1 DESIGN REQUIREMENTS

- A. Firestopping should avoid flame retardants orthophthalate plasticizers and heavy metal stabilizers.
- B. Conform to applicable code UL and WH for fire resistance ratings and surface burning characteristics.
- C. Provide certificate of compliance from authority having jurisdiction indicating approval of materials used.

2.2 ACCEPTABLE MANUFACTURERS

- A. Basis of Design: Hilti, Inc.
- B. A/D Fire Protection Systems.
- C. Nelson Firestop Products.
- D. Specified Technologies, Inc. (STI), SpecSeal Firestop Products.
- E. 3M Fire Protection Products.
- F. Tremco Tremstop.
- G. Substitutions: Section 012500 - Substitution Procedures..

2.3 DESCRIPTION

- A. Provide firestopping composed of components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the firestopping under conditions of service and application, as demonstrated by the firestopping manufacturer based on testing and field experience.
- B. Provide components for each firestopping system that are needed to install fill material. Use only components specified by the firestopping manufacturer and approved by the qualified testing agency for the designated fire-resistance-rated systems.

- C. Use only firestop products that have been UL 1479, ASTM E814 or UL 2079 tested for specific fire-rated construction conditions conforming to construction assembly type, penetrating item type, annular space requirements, and fire-rating involved for each separate instance.
- D. Product Description:
 - 1. Silicone Firestopping Elastomeric Firestopping: Single component silicone elastomeric compound.
 - 2. Elastomeric Joint Sealant: Single component silicone free elastomeric compound.
 - 3. Foam Firestopping Compounds: Two component foam compound.
 - 4. Formulated Firestopping Compound of Incombustible Fibers: Formulated compound mixed with incombustible non-asbestos fibers.
 - 5. Fiber Stuffing and Sealant Firestopping: Composite of mineral or ceramic fiber stuffing insulation with silicone elastomer for smoke stopping.
 - 6. Mechanical Firestopping Device with Fillers: Mechanical device with incombustible fillers and silicone elastomer, covered with sheet stainless steel jacket, joined with collars, penetration sealed with flanged stops.
 - 7. Intumescent Firestopping: Intumescent putty compound which expands on exposure to surface heat gain.
 - 8. Firestop Bricks: Formed mineral fiber bricks.
- E. Color: As selected from manufacturer's full range of colors.

2.4 MATERIALS

- A. Intumescent Firestop Sealants and Caulks:
 - 1. Hilti FS-ONE MAX.
- B. Latex Firestop Sealant:
 - 1. Hilti CP 606.
- C. Silicone Firestop Sealants and Caulks:
 - 1. Hilti CFS-S SIL GG
- D. Firestop Putty:
 - 1. Hilti Putty Pad CP 617.
 - 2. Hilti Putty Pad CFS-P PA.

3. Hilti Putty Stick CP 618.
 4. Hilti Cable Disk CFS-D.
 5. Hilti Putty Roll CP 619T.
 6. Hilti Box Insert.
- E. Firestop Collars:
1. Hilti CP 643N/ CP 644.
- F. Firestop Cable Collar
1. Hilti CFS-CC.
- G. Wrap Strips:
1. Hilti CP648-S / CP 648-E.
- H. 2-Part Silicone Firestop Foam:
1. Hilti CP 620.
- I. Firestop Mortar:
1. Hilti CP 637.
- J. Composite Board:
1. Hilti FS 675.
 2. Hilti CFS-COS.
- K. Firestop Pillows:
1. Nelson PLW Firestop Pillow.
 2. STI "SpecSeal" Firestop Pillows.
- L. Firestop Blocks & Plugs:
1. Hilti CFS-BL
 2. Hilti CFS-PL
- M. Firestop Joint Sealants:
1. Hilti CFS-SP WB
 2. Hilti CFS-S SIL SL

3. Hilti CFS-SP SIL

N. Pre-Formed Firestop Devices

1. Hilti Speed Sleeve CP 653.
2. Hilti Sleeve Kit CFS-SL SK.
3. Hilti Retrofit Sleeve Kit CFS-SL RK.
4. Hilti Gangplate CFS-SL GP.
5. Hilti Cast-in-Place CP 680.
6. Hilti Cast-in Place metal Deck CP 680 MD.
7. Hilti Tub Box Kit CP 681.
8. Hilti Drop-in Device CFS-DID.
9. Hilti QuickSeal CFS-EOS QS.

O. Prefabricated Joints

1. Hilti Top Track Seal CFS-TTS.
2. Hilti Top Track Seal Metal Deck CFS-TTS MD.
3. Hilti CFS-EOS QS Edge of Slab Quickseal

P. Other applications:

1. Specialty products, approved by the Architect, for atypical penetration conditions.

Q. Color: As selected from manufacturer's full range of colors.

2.5 ACCESSORIES

- A. Primer: Type recommended by firestopping manufacturer for specific substrate surfaces and suitable for required fire ratings.
- B. Fire Resistant Seal Compound: Fire resistant sealing compound which is listed as part of the fire and smoke system used at top of rated partitions. In all cases, sealing compound must be UL listed and approved by local governing authorities. Coordinate with Section 092116 - Gypsum Board Assemblies.
1. USG Interiors, Inc. "Firecode Compound"
- C. Installation Accessories: Provide clips, collars, fasteners, temporary stops or dams, and other devices required to position and retain materials in place.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 013100 - Project Management and Coordination: Coordination and project conditions.
- B. Verify openings are ready to receive firestopping.

3.2 PREPARATION

- A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other matter affecting bond of firestopping material.
- B. Remove incompatible materials affecting bond.
- C. Install backing or damming materials to arrest liquid material leakage.

3.3 APPLICATION

- A. Install material at fire rated construction perimeters and openings containing penetrating sleeves, piping, ductwork, conduit and other items, requiring firestopping.
- B. Apply primer where recommended by manufacturer for type of firestopping material and substrate involved, and as required for compliance with required fire ratings.
- C. Apply firestopping material in sufficient thickness to achieve required fire and smoke rating, to uniform density and texture.
- D. Compress fibered material based on UL system requirements.

3.4 FIELD QUALITY CONTROL

- A. Section 014000 - Quality Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Inspect installed firestopping for compliance with specifications and submitted schedule.

3.5 CLEANING

- A. Section 017700 - Closeout Procedures: Final cleaning.
- B. Clean adjacent surfaces of firestopping materials.

3.6 PROTECTION OF INSTALLED CONSTRUCTION

- A. Section 016000 - Product Requirements: Protecting installed construction.
- B. Protect adjacent surfaces from damage by material installation.

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes
 - 1. Nonsag gunnable joint sealants.
 - 2. Joint backings and accessories.

1.2 REFERENCE STANDARDS

- A. ASTM C919 - Standard Practice for Use of Sealants in Acoustical Applications; 2022.
- B. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016 (Reapproved 2023).
- C. ASTM C1521 - Standard Practice for Evaluating Adhesion of Installed Weatherproofing Sealant Joints; 2019 (Reapproved 2020).
- D. SCAQMD 1168 - Adhesive and Sealant Applications; 1989, with Amendment (2022).

1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit manufacturer's technical datasheets for each product to be used; include the following:
 - 1. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
 - 2. List of backing materials approved for use with the specific product.
 - 3. Backing material recommended by sealant manufacturer.
 - 4. Substrates that product is known to satisfactorily adhere to and with which it is compatible.
 - 5. Substrates the product should not be used on.
 - 6. Installation instructions, including precautions, limitations, and recommended backing materials and tools.
- C. Samples: Submit one sample, 2 x 1/4 inch in size illustrating sealant colors for each product selection.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years documented experience.

C. Mock up

1. Section 014000 - Quality Requirements: Requirements for mockup.
2. Construct mockup of sealant joints in conjunction with mockups specified in other sections.
3. Incorporate accepted mockup as part of Work unless noted otherwise.

D. Field Adhesion Tests of Joints: Test for adhesion using most appropriate method in accordance with ASTM C1521, or another applicable method as recommended by manufacturer.

1.5 ENVIRONMENTAL REQUIREMENTS

A. Section 016000 - Product Requirements.

B. Do not proceed with installation of joint sealants under the following conditions:

1. Temperature and humidity conditions are outside the limits recommended by sealant manufacturer during and after installation or are below 40 deg 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 COORDINATION

A. Section 013000 - Administrative Requirements: Coordination and project conditions.

B. Coordinate Work with sections referencing this section.

1.7 WARRANTY

A. Special Manufacturer Warranty: Provide 2-year manufacturer warranty for installed sealants and accessories that fail to achieve a watertight seal, exhibit loss of adhesion or cohesion, or do not cure. Complete forms in Owner's name and register with manufacturer.

B. 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 PERFORMANCE REQUIREMENTS

- A. Provide elastomeric joint sealants that establish and maintain watertight and airtight continuous joint seals without staining or deteriorating joint substrates.

2.2 DESIGN REQUIREMENTS

- A. Meet emissions testing and requirements of CDPH Standard Test Method v1.1.
 1. VOC Content Requirements for Wet Applied Products: All adhesives, sealants and sealant primers wet-applied on site must meet the applicable chemical content requirements of SCAQMD Rule 1168, amended October 26, 2017, Adhesive and Sealant Applications, as analyzed by the methods specified in Rule 1168. The provisions of SCAQMD rule 1168 do not apply to adhesives and sealants subject to state or federal consumer product VOC requirements.
 2. Avoid halogenated flame retardants, orthophthalates, formaldehyde, and styrene.
 3. Prefer caulk type sealants.

2.3 ACCEPTABLE MANUFACTURERS

- A. Acoustical Sealants (Type A)
 1. Hilti.
 2. 3M.
 3. USG Sheetrock Brand Acoustical Sealant.
 4. Tremstop Smoke and Sound Sealant.
- B. General Interior (Type GI)
 1. Pecora, AC-20 + Silicone.
 2. Tremco, Tremflex 834.
- C. General Polyurethane (Type GP)
 1. Sikaflex NP1.
 2. Tremco, Dymonic FC.
 3. Sika, Sikaflex-15 LM.

D. General Silicone (Type GS)

1. Dowsil 790, 791 and 795.
2. Pecora 890FTS.
3. Tremco Spectrem 1.
4. Sika, Sikasil WS-290.

E. Weather Barrier Sealant (Type WB)

1. Dow Corning 758 Silicone Weather Barrier Sealant.
2. Prosoco R-Guard AirDam.

F. Substitutions under provisions of Section 012500.

2.4 JOINT SEALANT APPLICATIONS

- A. Refer to Schedule at end of section.

2.5 JOINT SEALANTS - GENERAL

- A. Sealants and Primers: Provide products having lower volatile organic compound (VOC) content than indicated in SCAQMD 1168.
- B. 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.
- C. Colors: Unless otherwise specified, match color of adjacent material occurring in same plane. Where joints occur adjacent to two or more material colors in same plane, match color of lighter adjacent material, unless otherwise directed. Custom colors for exposed sealants may be required if standard colors are not acceptable to the Architect.

2.6 NONSAG ELASTOMERIC JOINT SEALANTS

- A. General: Comply with ASTM C920 and other requirements indicated for each liquid applied chemically curing sealant specified, including those referencing ASTM C920 classifications for type, grade, class, and uses related to exposure and joint substrates.
- B. Type A (Acoustical) Sealant: Non-hardening, non-bleeding, non-drying resilient caulk. ASTM C920, Grade NS, Class 121/2, Uses M and A; single component.
1. Use for concealed locations only.
 2. Applications: Refer to Section 092116 - Gypsum Board Assemblies.

- C. Type GI (General Interior) General Purpose Interior Sealant: Acrylic emulsion latex; ASTM C834, Type OP, Grade NF, single component, paintable.
 - 1. Applications: Use for interior non moving wall and ceiling control joints, joints between door and window frames and wall surfaces, and other interior joints for which no other type of sealant is indicated.
- D. Type GP (General Polyurethane) General Purpose Polyurethane Sealant: one component, nonpriming, elastomeric, gun-grade; ASTM C920, Type S, Grade NS, Class 35; Uses T, NT, M, A, and O.
 - 1. Exterior Applications: Use for expansion joints, aluminum curtain walls and storefronts, roofing, fascia, parapets, and structural components.
- E. Type GS (General Silicone) High Performance General Purpose Exterior (Non-traffic) Sealant Silicone; ASTM C920, Grade NS, Type S, Class 100/50, Uses M, G, and A; single component.
 - 1. Applications: Use for control, expansion, and soft joints in masonry; joints between concrete and other materials; joints between metal frames and other materials, and other exterior non-traffic joints for which no other sealant is indicated.
- F. Type WB (Weather Barrier Sealant) Compatible with air barrier. Single Component Silyl-Terminated-Polyether or multi component, neutral cure silicone sealant. ASTM C920, Grade NS, Class 25, Uses NT, M, G, A and O.
 - 1. Applications: Use at interior side of windows, louvers and doors.

2.7 ACCESSORIES

- A. Sealant Backing Materials, General: Materials placed in joint before applying sealants; assists sealant performance and service life by developing optimum sealant profile and preventing three-sided adhesion; type and size recommended by sealant manufacturer for compatibility with sealant, substrate, and application.
 - 1. Provide sealant backings of material and type that are nonstaining; 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. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.
- C. Masking Tape: Self-adhesive, nonabsorbent, nonstaining, removable without adhesive residue, and compatible with surfaces adjacent to joints and sealants.
- D. Joint Cleaner: Noncorrosive and nonstaining type, type recommended by sealant manufacturer; compatible with joint forming materials.
- E. Primers: Type recommended by sealant manufacturer to suit application; nonstaining.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that joints are ready to receive work.
- B. Verify that backing materials are compatible with sealants.
- C. Verify that backer rods are of the correct size.

3.2 PREPARATION

- A. 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 loose materials and foreign matter that could impair adhesion of sealant.
 - a. 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.
 - 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.
 - 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.
- B. Prime as necessary, in accordance with manufacturer's instructions.
 - 1. 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. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.
- D. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.

3.3 INSTALLATION

- A. Install this work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.

- B. Provide joint sealant installations complying with ASTM C1193.
- C. Install acoustical sealant application work in accordance with ASTM C919.
- D. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer, except where specific dimensions are indicated.
 - 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.
- E. Install bond breaker backing tape where backer rod cannot be used.
- F. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces 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. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.
- H. Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint. Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.
 - 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.

3.4 CLEANING

- A. Section 017700 - Closeout Procedures: Final cleaning.
- B. 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.

3.5 PROTECTION OF INSTALLED CONSTRUCTION

- A. Section 017000 - Execution: Protecting installed construction.
- B. Protect 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.

3.6 SCHEDULE

- A. Unless noted otherwise, provide sealant at 1) all joints in similar/same materials; 2) all joints between dissimilar materials and 3) in all cracks of any size. For joints or cracks exceeding $\frac{1}{4}$ inch in width, use appropriately sized foam backer rod in addition to sealant.
- B. Joints between Exterior Metal Frames and Adjacent Work: Type GS.
- C. Interior Joints for Which No Other Sealant is Indicated: Type GI.
- D. In Interior Walls, Between Metal Stud Track/Runner and Adjacent Construction. Between Outlet Boxes and Gypsum Board: Type A.

END OF SECTION

DIVISION 08

OPENINGS

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes
 - 1. Hollow Metal Doors and Frames.

1.2 REFERENCE STANDARDS

- A. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.
- B. ANSI/SDI A250.6 - Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames; 2020.
- C. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100); 2023.
- D. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.
- E. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable; 2023, with Editorial Revision.
- F. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2023.
- G. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic-Cement Concrete; 2020.
- H. ASTM C476 - Standard Specification for Grout for Masonry; 2023.
- I. BHMA A156.115 - Hardware Preparation in Steel Doors and Frames; 2016.
- J. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.
- K. NAAMM HMMA 830 - Hardware Selection for Hollow Metal Doors and Frames; 2002.
- L. NAAMM HMMA 831 - Hardware Locations for Hollow Metal Doors and Frames; 2011.
- M. NAAMM HMMA 840 - Guide Specifications For Receipt, Storage and Installation of Hollow Metal Doors and Frames; 2017.
- N. NAAMM HMMA 861 - Guide Specifications for Commercial Hollow Metal Doors and Frames; 2014.
- O. SDI 117 - Manufacturing Tolerances for Standard Steel Doors and Frames; 2023.

1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures.

- B. Provide a schedule of doors and frames using same reference numbers for details and door openings as those on the contract documents.
- C. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes. Submit door configurations and location of cut-outs for hardware reinforcement.
- D. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and any indicated finish requirements. Indicate door elevations, internal reinforcement, closure method, cut-outs for glazing, and finishes.
- E. Product Maintenance Data: Include dent and scratch repair. Submit recommended areas to be inspected and inspection intervals.

1.4 QUALITY ASSURANCE

- A. Conform to requirements of SDI-100/ANSI A250.8.
- B. Provide steel doors and frames from single manufacturer.
- C. Manufacturer Qualifications: Provide hollow metal doors and frames from SDI Certified manufacturer: <https://steeldoor.org/sdi-certified/#sle>.
- D. Maintain at project site copies of reference standards relating to installation of products specified.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Comply with NAAMM HMMA 840 or ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
- B. Section 016000 - Product Requirements: Storage and Handling.
- C. Accept frames on site in manufacturer's packaging. Inspect for damage.
- D. Maintain protected area on site for storage of frames to be installed. Door frames must be stored on pallets or wood sleepers. Do not store directly on earth or concrete.
- E. Handle frames in such a way as to avoid damage or scratches.
- F. Any rust discovered on door or frames during construction will result in rejection and replacement of door and frame.
- G. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion and adverse effects on factory applied painted finish. Break seal on-site to permit ventilation.

1.6 COORDINATION

- A. Coordinate door and frame installation with size, location, and installation of service utilities.
- B. Coordinate Work with door hardware installation.

- C. Sequence installation to ensure door hardware electric wire connections are achieved in an orderly and expeditious manner.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Ceco Door, an Assa Abloy Group company: www.assaabloydss.com/#sle.
- B. Curries, an Assa Abloy Group company: www.assaabloydss.com/#sle.
- C. Allegion Steelcraft.
- D. Stiles Steel Door + Window Systems.
- E. Substitutions: As specified in Section 012500 - Substitution Procedures.

2.2 PERFORMANCE REQUIREMENTS

- A. Requirements for Hollow Metal Doors and Frames:
 - 1. Steel Sheet: Comply with one or more of the following requirements; galvanized steel complying with ASTM A653/A653M, cold-rolled steel complying with ASTM A1008/A1008M, or hot-rolled pickled and oiled (HRPO) steel complying with ASTM A1011/A1011M, commercial steel (CS) Type B, for each.
 - 2. Accessibility: Comply with ICC A117.1 and ADA Standards.
 - 3. Hardware Preparations, Selections and Locations: Comply with NAAMM HMMA 830 and NAAMM HMMA 831 or BHMA A156.115 and ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
- B. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

2.3 HOLLOW METAL DOORS

- A. Door Finish: Factory primed and field finished.
- B. Exterior Doors (Thermally Insulated): SDI-100. 1-3/4" thick.
 - 1. Level 4 - Maximum Duty, Model 2, seamless design.

2.4 HOLLOW METAL FRAMES

- A. Comply with standards and/or custom guidelines as indicated for corresponding door in accordance with applicable door frame requirements.
- B. Standard shop fabricated galvanized steel frames, rated and non-rated types.
 - 1. Exterior Frames:
 - a. Level 3, nominal 16 gage/0.053 inch thick material, base metal thickness.
- C. Frame Finish: Factory primed and field finished.
- D. Borrowed Lites Glazing Frames: Construction and face dimensions to match door frames, and as indicated on drawings.
- E. Provide mortar guard boxes for hardware cut-outs in frames to be installed in masonry or to be grouted.

2.5 PROVISION FOR HARDWARE

- A. Hardware Reinforcement: Conform to ANSI A156.115 and ANSI A250.6. Factory reinforce, drill, and tap doors to receive mortised hinges, locks, latches, flush bolts, and concealed door closers.
- B. Use hardware templates furnished by hardware manufacturer.
- C. Hardware Reinforcing: Steel, meet or exceed following:
 - 1. Hinges:
 - a. Hollow Metal Doors: 10 gauge or 12 gauge channel, full door height, with equivalent threads.
 - b. Hollow Metal Frames: 7 gauge.
 - 2. Locks:
 - a. Hollow Metal Doors: 12 gauge or equivalent number of threads.
 - 3. Surface Closers:
 - a. Hollow Metal Doors: 12 gauge by 5-1/4 inch wide U-Channel reinforcement welded to door end channels. Flat reinforcements not accepted.
 - b. Hollow Metal Frames: 12 gauge plate reinforcements welded to frames according to type of door closer installation.
 - 4. Hold Open Arms:
 - a. Hollow Metal Doors: 12 gauge U-Channel.

- 5. Panic Devices:
 - a. Hollow Metal Doors: 14 gauge U-Channels at fastening positions.
- 6. Floor Check Hinges and Pivots:
 - a. Hollow Metal Doors: 7 gauge.
- D. Finish Hardware Locations: Refer to Section 087100 - Door Hardware.
- E. Field Tapping and Drilling: Accepted at surface-applied hardware.
- F. Door Silencers: Drill door frame stops to receive silencers at each door swing. Insert plastic plugs to keep holes open during painting and construction activities.
- G. Plaster Guards: Provide at silencers, strike pockets, and hinge reinforcements.

2.6 FABRICATION

- A. Frames:
 - 1. Fabricate frames as full welded units. Knock down frames are not acceptable.
 - 2. Transom Bars for Glazed Lites: Fixed type, of same profiles as jamb and head.
 - 3. Fabricate frames with hardware reinforcement plates welded in place. Provide mortar guard boxes. Provide heavy duty hinge plate reinforcements with a minimum of 1" continuous weld at top and bottom.
 - 4. Plaster Guards: Weld 16 gauge steel plaster guards or mortar boxes to frame at back of finish hardware cutouts where finish materials might obstruct hardware operation.
 - 5. Reinforce frames wider than 48 inches with roll formed steel channels fitted tightly into frame head, flush with top.
 - 6. Prepare frames for silencers. Provide three single silencers for single doors and mullions of double doors on strike side. Provide two single silencers on frame head at double doors without mullions.
 - 7. Do not provide silencers on frames to be provided with smoke seals or conflicting weatherstripping.
 - 8. Fabricate frame profiles as detailed on the drawings.
- B. Exterior Doors: ANSI A250.8/SDI-100. Passing ANSI A250.4 Acceptance Criteria, Level A (1 million cycles).
 - 1. Face Sheets: 16 gauge steel.
 - 2. Core Design: Injected polyurethane foam; R-Value of 2.7 minimum.

3. Vertical Internal Stiffening: 20 gauge steel hat channels, space 6 inches on center, spot weld to skins.
4. Vertical Edge Reinforcement: One piece, continuously arc welded full length to face sheets.
 - a. Lock Channel: 14 gauge steel, beveled 1/8 inch in 2 inch.
 - b. Hinge Channel: 12 gauge steel, formed and tapped for hinges.
5. Top and Bottom Channel Reinforcement: 16 gauge steel.
6. Top Rail Closure Channel: 16 gauge steel with flush channel filler cap sealed against water penetration.
- C. Vertical Door Edges: Bevel 1/8 inch in 2 inch at strike side vertical edges and square at hinge side.
- D. Hardware Reinforcement: Fabricate and weld into place. Include concealed stiffeners, reinforcement, edge channels, and moldings fabricated from either cold-rolled or hot-rolled 16 gauge steel.
- E. Exposed Joints: Arc weld continuously, full length. Grind, dress, and make smooth for flush, seamless appearance at edges and joinery.
- F. Welded Construction: Weld door skins to perimeter channels. Glued channels not accepted.

2.7 FINISHES

- A. Thoroughly clean and chemically treat for maximum adhesion.
- B. Galvanizing: ASTM A 653, A60 galvanized. Wipe coat galvanized steel (WCGS) coating systems not accepted. Compatible with finish paint specified in Section 099000 - Painting and Coating.
 1. Use at Exterior Doors and Frames.

2.8 ACCESSORIES

- A. Primer: ANSI/SDI Standard A250.10 factory applied.
- B. Silencers: Manufacturer's standard.
- C. Weatherstripping and Smoke Seals: Manufacturer's standard.
- D. Glazing: Factory installed. Low e coating to meet requirements of WA State Energy Code. Vitro Solarban 60 on clear or equivalent.
 1. Total Thickness: 1 inch nominal.
 2. Exterior Pane: Tempered
 3. Interspace: 5/8 inch, 90% argon/10% air fill.

- 4. Interior Pane: Tempered
- 5. Provide safety glazing label.
- E. Grout for Frames in Masonry: Mortar grout complying with ASTM C476 with maximum slump of 4 inches as measured in accordance with ASTM C143/C143M for hand troweling in place; plaster grout and thinner pumpable grout are prohibited.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that opening sizes and tolerances are acceptable.
- C. Verify that finished walls are in plane to ensure proper door alignment.

3.2 INSTALLATION

- A. Install doors and frames in accordance with manufacturer's instructions and related requirements of specified door and frame standards or custom guidelines indicated.
- B. Install doors and frames in accordance with SDI-100/ANSI A250.8 and DHI. Countersink anchor screws, putty, prime and paint to provide concealed anchor finish.
- C. Install roll formed steel reinforcement channels between two abutting frames. Anchor to structure and floor.
- D. Coordinate frame anchor placement with wall construction.
- E. Grout frames in masonry construction, using hand trowel methods; brace frames so that pressure of grout before setting will not deform frames.
- F. Install door hardware.
 - 1. Comply with recommended practice for hardware placement of doors and frames in accordance with ANSI/SDI A250.6 or NAAMM HMMA 861.

3.3 TOLERANCES

- A. Clearances Between Door and Frame: Comply with related requirements of specified frame standards or custom guidelines indicated in accordance with SDI 117 or NAAMM HMMA 861.
- B. Maximum Diagonal Distortion: 1/16 inch measured with straight edge, corner to corner.

3.4 ADJUSTING

- A. Adjust for smooth and balanced door movement.

3.5 SCHEDULE

- A. Refer to Door and Frame Schedule on the drawings.

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes
 - 1. Interior access doors and panels with frames.

1.2 SUBMITTALS

- A. Submit under provisions of Section 013300 - Submittal Procedures.
- B. Product Data: Provide sizes, types, finishes, hardware, scheduled locations, Fire resistance and details of adjoining work.
- C. Shop Drawings: Indicate exact position of each access door and/or panel unit.
- D. Manufacturer's Installation Instructions: Indicate installation requirements and rough-in dimensions.
- E. Project Record Documents: Record actual locations of each access unit.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Activar Construction Products Group - J. L. Industries.
- B. Karp Associates, Inc.
- C. Nystrom Products Co.
- D. Milcor LTD, Partnership.
- E. Substitutions: Under provisions of Section 012500.

2.2 ACCESS DOORS AND PANELS ASSEMBLIES

- A. Description: Provide for access to controls, valves, traps, dampers, cleanouts, and similar items requiring operation behind inaccessible finished surfaces.
 - 1. Coordinate exact locations with various trades to assure proper placement of access doors and panels.
 - 2. Conform to UL, Warnock Hersey (WHI), or other approved design, for fire rated wall and ceiling assemblies.
- B. Interior Non Rated Flush Access Panels:
 - 1. Frame: 16 gage steel with a 1 inch wall flange.
 - 2. Door: Minimum 16 gage steel access door.

3. Hinge: Minimum 90 degree continuous concealed hinge.
4. Finish: Manufacturer's shop primer.
5. Lock: Flush screwdriver-operated steel cam or cylinder lock keyed to district standard.

2.3 FABRICATION

- A. Furnish each access panel assembly manufactured as an integral unit, complete and ready for installation.
- B. Provide attachment devices and fasteners of the type required to secure access doors to the types of support shown.
- C. Flush Access Panels: Fabricate units of continuous welded construction; weld, fill, and grind joints to assure flush and square unit.
- D. Latching Mechanisms: Furnish number required to hold panels in flush, smooth plane when closed.
 1. For cylinder locks, furnish 2 keys per lock and key all locks alike.
 2. For recessed panels, provide access sleeves for each locking device. Furnish plastic grommets and install in holes cut through finish.
- E. Touch up shop primer and prepare for field paint finish coat.
- F. Size Variations: Obtain acceptance of manufacturer's standard size units which vary slightly from sizes shown or scheduled.

2.4 SHOP FINISHING

- A. Base Metal Protection: Galvanized finish. Prime coat units with baked on primer.
- B. Exposed Finish: Field paint to match wall or ceiling surfaces as specified Section 099000.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that rough openings for access doors and panels are correctly sized and located.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to proceeding with this work.
- B. Prepare surfaces using methods recommended by manufacturer for applicable substrates in accordance with project conditions.

3.3 INSTALLATION

- A. Install units in accordance with manufacturer's instructions.
- B. Install frames plumb and level in openings, with plane of door and panel face aligned with adjacent finished surfaces and secure units rigidly in place.
- C. Position units to provide convenient access to concealed equipment when necessary.

3.4 ADJUSTING AND CLEANING

- A. Adjust access panels to operate easily without binding. Verify that integral locking/latching devices operate properly.
- B. Remove panels and frames that are warped, bowed, or otherwise damaged, and replace with new components.
- C. On completion of access panel installation, clean interior and exterior surfaces as recommended by manufacturer.

END OF SECTION

DIVISION 09

FINISHES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Interior gypsum board.
2. Drywall trim and finishing (joint tape and compound).
3. Finishing Accessories.

1.2 REFERENCES

A. ASTM International:

1. ASTM C475 - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.
2. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board.
3. ASTM C954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. to 0.112 in in Thickness.
4. ASTM C1002 - Standard Specification for Steel Self Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.
5. ASTM C1047 - Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base.
6. ASTM C1178 - Standard Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel.
7. ASTM C1396 - Standard Specification for Gypsum Board.
8. ASTM C1513 - Standard Specification for Steel Tapping Screws for Cold Formed Steel Framing Connections.
9. ASTM C1629 - Standard Classification for Abuse Resistant Nondecorated Interior Gypsum Panel Products and Fiber Reinforced Cement Panels.
10. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.
11. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
12. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.

B. Gypsum Association:

1. GA-214 - Recommended Levels of Gypsum Board Finish.
 2. GA-216 - Specifications for the Application and Finishing of Gypsum Panel Products.
 3. GA-234 - Control Joints for Fire-Resistance Rated Systems.
 4. GA-600 - Fire Resistance Design Manual Sound Control Gypsum Systems.
- C. Underwriters Laboratories, Inc.:
1. Fire Resistance Directory.

1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit data for each type of product indicated.
- C. Shop Drawings:
1. Indicate installation details required for seismic design loads.
 2. Indicate layout of control joints.

1.4 QUALITY ASSURANCE

- A. Single Source Responsibility: Obtain gypsum board products from a single manufacturer, or from manufacturers recommended by the prime manufacturer of gypsum boards. Provide all components of each wall assembly from a single manufacturer.
- B. Mockups: Before beginning gypsum board installation, install mockups of at least 100 sq. ft. in surface area to demonstrate aesthetic effects and set quality standards for materials and execution. Install mockups representative of partition assemblies designated and as follows:
1. Level of gypsum board finish as indicated for use with wall type indicated.
 2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- C. Qualifications:
1. Manufacturer: Company specializing in manufacturing products specified in this section with minimum five years documented experience.
 2. Installer: Company specializing in performing Work of this section with minimum five years documented experience.
- D. Pre-Installation Meeting:
1. Section 013119 - Project Meetings: Pre-installation meeting.

2. Convene minimum one week prior to commencing Work of this section.

1.5 PROJECT CONDITIONS

- A. Environmental Conditions: Comply with ASTM C840 requirements for gypsum board application or written recommendations of gypsum board manufacturer, whichever is more stringent, for environmental conditions before, during and after application of gypsum board.
- B. Cold Weather Protection: When ambient outdoor temperatures are below 55 degrees F. maintain continuous, uniform, comfortable building working temperatures of not less than 55 degrees F. for a minimum period of 48 hours prior to, during and following application of gypsum board and joint treatment materials. Do not install interior products until installation areas are enclosed and conditioned.
- C. Ventilation: Provide controlled ventilation during joint finishing operations to eliminate excessive moisture. Avoid drafts during hot, dry weather to prevent excessively fast drying of joint compound.
- D. Dehumidification: Refer to NWCB Technical Document Gypsum Wallboard 300-103 for required drying.

PART 2 PRODUCTS

2.1 SYSTEM DESCRIPTION

- A. General: Perform work in accordance with Gypsum Association publications:
 1. GA-214 - Recommended Levels of Gypsum Board Finish.
 2. GA-216 - Specifications for the Application and Finishing of Gypsum Panel Products.

2.2 DESIGN REQUIREMENTS

- A. Seismic Loads: Design and size components to withstand seismic loads and sway displacement as calculated according to ASCE 7 and applicable codes for Seismic Design Category indicated on Structural Drawings.
- B. Meets CDPH Standard Method emissions criteria.

2.3 GYPSUM BOARD

- A. Acceptable Manufacturers
 1. USG, Chicago, IL, 312.436.4000. (<http://www.usg.com>).
 2. Georgia-Pacific, (<http://www.gp.com>)
 3. Certainteed, (<http://www.certainteed.com>)
 4. Substitutions: Under provisions of Section 012513.

B. Gypsum Wallboard (GWB):

1. USG Sheetrock Brand Firecode; Georgia-Pacific ToughRock Fireguard X; Certainteed Gypsum Board or approved equal.
2. ASTM C1396, Type "X", tapered edged, 5/8 inch thick;
3. Furnish boards in maximum lengths available to minimize end-to-end joints; 48-inches wide.
4. Greenguard Gold Certified.

2.4 GYPSUM BOARD TRIM ACCESSORIES

- A. Standard Metal Trim: Unless otherwise noted, Beadex Manufacturing Co., Inc. trim is specified. Substitution of trim members by other manufacturers is acceptable conforming to ASTM C1047 and Section 012500 - Substitution Procedures. Provide galvanized steel laminated with paper trim designed for concealed metal and for application without mechanical fastening, unless otherwise specified; sizes compatible with thickness of drywall.
1. Outside Corners: Right angle trim with paper surface to receive cement; Beadex "No. B1."
 2. Exposed Edges: "L" shaped trim with paper surface to receive cement; size to suit wallboard thickness. Beadex "No. B4."
 3. Edges Abutting Dissimilar Materials: "L" shaped trim with paper surface to receive cement and factory applied masking; size to suit wallboard thickness. Beadex "Premask L."
 4. Control Joints: Roll-formed zinc trim with tape-protected 1/4-inch opening, 7/16 inch deep. Cemco 093 or Clark Dietrich 093 Zinc Control Joint, or approved substitution.

2.5 GYPSUM BOARD JOINT TREATMENT MATERIALS

- A. General: Provide materials as hereinafter specified, complying with ASTM C475; use only compatible compounds from one manufacturer.
1. Joint Tape for Drywall: USG "Sheetrock Brand," or approved high-strength fiber paper tape with feather (sanded) edges.
 2. Joint Treatment for Standard Gypsum Wallboard Panels: Joint compound for embedding paper tape and for first fill coat over metal trim and fasteners except as otherwise indicated. Comply with ASTM C475 and manufacturer's recommendations.
 - a. Beadex "Pre-Mixed Taping Compound"
 - b. USG "Ready-Mixed Taping Joint Compound, All Purpose"
 - c. Substitutions: As specified in Section 012500 - Substitution Procedures.
 3. Joint compound for second and third coats, except for Tile Backer Board:

- a. Beadex "Pre-Mixed Finishing Compound"
 - b. USG "Ready-Mixed, Topping Joint Compound, All Purpose"
 - c. Substitutions: As specified in Section 012500 - Substitution Procedures.
4. Joint Treatment for Tile Backer Board: Use exterior rated tape and setting-type taping compound and setting-type, sandable topping compound as recommended by the board manufacturer.

2.6 GYPSUM BOARD MISCELLANEOUS MATERIALS

- A. General: Provide auxiliary materials for gypsum drywall work of the type and grade recommended by the manufacturer of the gypsum board.
- B. Fasteners:
 - 1. Steel Drill Screws: ASTM C1002 and ASTM C1513, for fastening gypsum board to steel members, unless otherwise indicated.
 - a. Comply with ASTM C954, screws for fastening to 10 gauge or heavier steel studs.
 - b. For fastening tile backer board, use screws of type and size recommended by panel manufacturer.
- C. Fire Resistant Seal Compound: As specified in Section 078400 - Firestopping.
- D. Acoustical Sealant: As specified in Section 079200 - Joint Sealants.
 - 1. Sealant shall be a paintable, non-hardening, non-bleeding, non-drying, resilient caulk and meet ASTM C834.
- E. Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate. Comply with project's VOC content limits.

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, mold or otherwise damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected. Beginning of installation means acceptance of existing substrate and site conditions.

3.2 GENERAL INSTALLATION REQUIREMENTS

- A. General: Comply with applicable requirements of ASTM C840 and GA 216, fire rated assembly requirements and as specified herein, unless otherwise required by local building authorities.

3.3 FINISHING

- A. Installation: Tape and finish drywall in accordance with GA-214/ASTM C840, for Level of finish indicated below, unless detailed otherwise.
- B. Finishing Schedule:
 - 1. Level 2: Gypsum board above finished ceilings.
 - 2. Level 3: Gypsum board in utilitarian rooms as mechanical/electrical room, storerooms, custodial closets, except behind ceramic tile, blade second coat smooth.
 - 3. Level 4: Gypsum board in exposed to view (public) areas, and behind items that are mechanically attached or adhered including whiteboards, tackboards, casework, panel systems, etc., unless skim coat is required to create a smooth surface at abuse resistant and impact resistant panels.

3.4 GYPSUM BOARD INSTALLATION

- A. Install gypsum board units in accordance with ASTM C840 and manufacturer's instructions.
- B. At areas of demolishing and removing existing GWB:
 - 1. Clean surfaces to ensure the adhesion of new finishes.
 - 2. Examine existing coatings to assess their adhesion. Provide sound surface for repainting including solvent cleaning, basic patching/filling, caulking, light sanding/abrading and feather edge sanding.
 - 3. Fill, patch, tape cracks in drywall and nail pops.
 - 4. Sand to minimize surface defects.
 - 5. Correct surface profile differences exceeding 1/16 inch.
- C. Erect single layer standard gypsum board in most economical direction, with ends and edges occurring over firm bearing. Stagger joints on opposite sides of partitions.
- D. Erect single layer fire rated gypsum board vertically, with edges and ends occurring over firm bearing. Stagger joints on opposite sides of partitions.
- E. When gypsum board is to be applied to both ceilings and walls, apply the gypsum board to the ceiling first and then to the walls, unless detailed otherwise.
- F. Use screws when fastening gypsum board to metal furring or framing.

- G. Multiple Layer Applications: Use gypsum backing board for first layer, placed over framing or furring members. Use fire rated gypsum backing board for fire rated partitions. Secure subsequent layers to substrate in manner required by code for indicated fire rating. Apply adhesive in accordance with manufacturer's instructions.
- H. Treat cut edges and holes in tile backer board with sealant.
- I. Place control joints consistent with lines of building spaces as indicated or directed.
- J. Place corner beads at all external corners. Use longest practical length. Place edge trim where gypsum board abuts dissimilar materials and at exposed edges.

3.5 JOINT TREATMENT

- A. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
- B. Feather coats onto adjoining surfaces so that camber is maximum 1/32 inch.
- C. Apply in accordance with manufacturer's instructions.

3.6 CONTROL AND EXPANSION JOINTS

- A. Position and install control and expansion joints.
- B. Coordinate with the framing installer to ensure that framing is installed immediately on either side of each control joint.
- C. Conform to GA-234.
- D. Space control joints as indicated or when not indicated, locate as follows (with Architect approval of locations):
 - 1. At maximum 30 foot intervals along continuous wall planes.
 - 2. At maximum 50 foot intervals at continuous ceilings with perimeter relief and each 2500 square foot of ceiling area.
 - 3. At maximum 30 foot intervals at continuous ceilings without perimeter relief.
 - 4. At locations where expansion or control joints occur in the building structure.
 - 5. At transitions with other wall substrates install where gypsum board spans masonry, concrete, metal studs and other materials.
 - 6. Locate control joints to form rectangular or square joints, in "L," "U," "T," or other irregularly shaped areas.
 - 7. Position control joints to intersect light fixtures, air diffusers, door opening, and other areas of stress concentration as detailed or approved.

3.7 ACOUSTICAL ACCESSORY INSTALLATION

- A. Place acoustical insulation where indicated in partitions tight within spaces, around cut openings, behind and around electrical and mechanical items within or behind partitions, and tight to items passing through partitions.
- B. Place acoustical insulation under V.A.V. boxes over partitions above ceiling. Refer to mechanical drawings for V.A.V. box locations.
- C. At all interior walls, install acoustical sealant at gypsum board perimeter for:
 - 1. Metal Stud Track Framing: Two beads.
 - 2. Base Layer.
 - 3. Face Layer.
 - 4. Caulk all penetrations of partitions by conduit, pipe, ductwork, rough-in boxes, etc.
- D. Method:
 - 1. Isolate all ductwork and pipe work over 2 inches in diameter (including sprinkler system) at penetrations as follows:
 - a. Provide a sheet metal (22 gauge) sleeve to cover the entire perimeter of a 1 inch to 1-1/2 inch (1/2 inch to 3/4 inch on each side) oversized penetration cut.
 - b. Plaster or caulk sleeve to the wall to ensure an airtight seal.
 - c. If ductwork or pipework penetrates a double wall, use a separate sleeve at each side of the wall (allow no sleeve connection between walls).
 - d. Pack the gap between the penetrating duct or pipe and the sleeve with Acoustical Insulation and seal airtight on both sides of the wall with an outer layer of Acoustical Sealant.
 - e. Do not use wall penetrations to support pipework or ductwork. Support pipe or duct just prior to and just after the penetration, so that the pipe or duct is centered in penetration.
 - f. Use the above penetration treatment regardless of the existence of external duct or pipe insulation. Size penetration large enough to pack additional Acoustical Insulation and apply Acoustical Sealant between the external insulation and the sheet metal sleeve.
 - 2. Isolate all pipe work 2 inches or less in diameter (including sprinkler system) at penetrations as follows:
 - a. Oversize penetration cut by 1/4 inch (1/8 inch each side).
 - b. Seal airtight on both sides of the wall with Acoustical Sealant.

- c. Do not use wall penetrations to support pipe work. Support pipe just prior to and just after the penetration, so that pipe is centered in penetration.
- d. Use the above penetration treatment regardless of the existence of external pipe insulation. Size penetration large enough to apply Acoustical Sealant between the external insulation and the pipes.

3.8 TOLERANCES

- A. Maximum Variation from True Flatness: 1/8 inch in 10 feet in any direction.

3.9 CLEANING AND PROTECTION

- A. Promptly remove any residual joint compound from adjacent surfaces.
- B. Provide final protection and maintain conditions, in manner suitable to Installer, to ensure gypsum board assemblies are without damage or deterioration at time of Substantial Completion.

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Metal studs for partition and ceiling framing as indicated for interior partitions.
2. Installation of access doors in metal framed walls and partitions.

1.2 REFERENCES

A. American Iron and Steel Institute:

1. AISI S220 - North American Standard for Cold-Formed Steel Framing - Non Structural Members.

B. ASTM International:

1. ASTM A641 - Standard Specification for Zinc Coated (Galvanized) Carbon Steel Wire.
2. ASTM A653 - Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc Iron Alloy-Coated (Galvannealed) by the Hot Dip Process.
3. ASTM C635 - Standard Specification for the Manufacture, Performance and Testing of Metal Suspension Systems for Acoustical Tile and Lay In Panel Ceilings.
4. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw Attached Gypsum Panel Products.
5. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board.
6. ASTM C1002 - Standard Specification for Steel Self Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.
7. ASTM E84 - Standard Test Methods for Surface Burning Characteristics of Building Materials.
8. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
9. ASTM E814 - Standard Test Method for Fire Tests of Penetration Fire Stop Systems.
10. ASTM E1966 - Standard Test Method for Fire Resistive Joint Systems.

C. American Society of Civil Engineers (ASCE) 7- Minimum Design Loads for Buildings and Other Structures.

D. Underwriters Laboratories:

1. UL 2079 - Standard Test for Fire Resistance of Building Joint Systems.

- E. Warnock Hersey International, Inc.

1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures.
- B. Design Data: Refer to Structural General Notes for deferred submittals/Bidder Design Systems.
 - 1. Provide published load table and criteria indicating section properties, height of wall limitations, combined axial and lateral load limitations, load and deflection criteria, and allowable loads for fasteners and welds.
 - a. For walls taller than 20 feet, provide stamped calculations for loadings and stresses of walls.
 - b. For walls less than 20 feet, provide manufacturer design data or stamped calculations.
 - c. Interior openings greater than 12 feet wide, provide stamped calculations.
 - d. Interior openings less than 12 feet wide, provide published load tables and criteria for jambs and headers or stamped calculations.
- C. Shop Drawings:
 - 1. Indicate component details, framed openings, anchorage to structure, type and location of fasteners, and accessories or items required of other related work.
 - 2. Describe method for securing studs to tracks, and for blocking and reinforcement to framing connections.
- D. Product Data: Submit data describing standard framing member materials and finish, product criteria, load charts, and limitations.
- E. Evaluation Reports: Submit evaluation reports certified under an independent third party inspection program administered by an agency accredited by International Accreditation Service (IAS). IAS to ICC-ES AC98 accreditation criteria for inspection agencies, from ICC-ES, or other qualified testing agency acceptable to authorities having jurisdiction.
- F. Manufacturer's Installation Instructions: Submit manufacturer's installation instructions .
- G. Manufacturer's Certification: Submit manufacturer's certification of product compliance with codes and standards along with product literature and data sheets for specified products.
- H. Code Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified in accordance with the product-certification program of the Steel Framing Industry Association (SFIA) or similar organization providing a verifiable code compliance program.

1.4 QUALITY ASSURANCE

- A. Allowable Tolerances: Provide framing to conform with the following allowable tolerances:
 - 1. Partition Framing: Plumb and located within plus or minus 1/4-inch of required locations.
 - 2. Ceiling Framing: Level within 1/8-inch in 10 feet and erected so that deflection of any component does not exceed deflection limits as indicated in design criteria after installation of all finish materials and equipment.
- B. Qualifications:
 - 1. Manufacturer: Company specializing in manufacturing products specified in this section with minimum five years documented experience. Steel Framing Manufacturer must have current Third Party Certification Report (ICC-ES, Intertek or IAPMO).
 - a. Framing Manufacturer: Current member of Steel Stud Manufacturers Association (SSMA) or the Steel Framing Industry Association (SFIA).
 - 2. Installer: Company specializing in performing Work of this section with minimum three years documented experience.
- C. Pre-Installation Meeting:
 - 1. Section 013119 - Project Meetings: Pre-installation meeting.
 - 2. Convene minimum one week prior to commencing work of this section.

PART 2 PRODUCTS

2.1 DESIGN REQUIREMENTS

- A. Design framing systems in accordance with AISI S220.
- B. Design Criteria for Metal Support Assemblies:
 - 1. Wall Support Framing: Resist lateral force of 5 pounds per square foot for full height partitions, and 200 pounds concentrated load applied anywhere over 10 sq. ft area for partial height partitions, and 100 pounds concentrated load for wall mounted light fixtures. For additional loads, coordinate with architectural attachments (TV's, cabinets, bleachers, etc.). 250 pound point load at grab bars, as required by Building Code and ASCE 7-16.
 - a. Deflection, Typical: Not exceed L/240 of the span; L/360 behind tile.
 - b. Stud Spacing, Typical: 16 inch O.C, unless otherwise indicated.
 - 2. Ceilings, GWB Framing: Design to support the following loading as indicated in AISI S220 and ASTM C754 guidelines.

- a. Live Load: 10 psf plus weight of steel framing.
- b. Deflection, Typical: Not to exceed L/360.

2.2 ACCEPTABLE MANUFACTURERS

- A. Cemco, 263 South Covina Lane, City of Industry, CA 91744.
- B. Clark Dietrich, 9050 Centre Pointe Drive, Suite 400, West Chester, OH 45069.
- C. Scafco Corporation, 6212 East Main Avenue, PO Box 11215, Spokane, WA 99211-1215.
- D. Steeler, Inc., 10023 Martin Luther King Way South, Seattle, WA 98178.
- E. Substitutions under provisions of Section 012500. Provide current Third Party Certification Report (ICC or IAMPO).

2.3 METAL SUPPORT MATERIALS

- A. Metal Studs (Typical Partition Studs)
 - 1. Cold form studs complying with AISI 220, fabricated from ASTM A653 steel sheet having a minimum yield strength of 33,000 psi; roll-formed "C" shaped with not less than 1-1/4 inch flange with 1/4 inch nominal return, and pre-punched webs for installation of mechanical and electrical items.
 - a. Size: Depth of studs as indicated on drawings and cross referenced with the appropriate height determination table to meet required performance.
 - b. Spacing: As indicated on architectural drawings.
 - c. Gage: Minimum base steel thickness 0.0296 (30 mil, 20 gage) unless noted otherwise. The use of equal or equivalent studs is acceptable. Cross reference with the appropriate height determination tables and Section 092216, par 2.1.A.1 to meet required performance.
 - d. Runners: Same gage as studs; size for friction fit to studs; type recommended by stud manufacturer for support of studs, and for vertical abutment of drywall work at other work. Unless noted otherwise, provide slotted top track with minimum 2-1/2 inch vertical legs accommodating +/- 3/4 inch deflection.
 - 2. Finish: Provide studs and runners with protective coating. Comply with AISI S220. Coatings shall have a protective coating meeting the requirements of ASTM A653, G40/Z120, typical and G60/Z180 at high moisture locations (locker rooms, cafeteria, toilet rooms) or shall have a protective coating with an equivalent corrosion resistance. Galvannealed products are unacceptable.

- a. Coatings providing equivalent corrosion resistance to a G40/Z120 shall demonstrate equivalent corrosion resistance with an evaluation report acceptable to the authority having jurisdiction.
- B. Wall Furring Members: AISI S220; minimum base steel thickness 0.0179 (18 mils, 25 gage), hat-shaped. Size 1-1/4 inch face width by 7/8 inch depth. Provide channels with manufacturer's standard zinc protective coating, except meeting ASTM A1003, G60/Z180, hot-dip galvanized zinc coating for exterior locations.
- C. Ponywall Support, provide one of the following options:
 - 1. Manufacturer's support stud and base plate to meet the design loads per Section 092216, par 2.1.A.1.
 - a. Acceptable Manufacturers:
 - 1) SCAFCO.
 - 2) ClarkDietrich.
 - 3) Steeler.
 - 4) Substitutions: Refer to Section 012500 - Substitution Procedures.
 - 2. Stamped calculations for engineered solution to meet the design loads per Section 092216, par 2.1.A.1.
 - a. Include shop drawings for the engineered solution prior to install for verification by Architect and Engineer.
- D. Restraining Angles (Top of Fire Rated Partitions): AISI S220, minimum base steel thickness: 0.0179 inch (25 gauge), 2½ x 2½ inches minimum. Provide angles with manufacturer's standard zinc protective coating, or be rolled formed from galvanized steel. Angles installed under Section 092116.
- E. Vertical Deflection Clip: Meeting UL 2079 and allowing 1-1/2 in unrestrained movement (¾ inch compression and ¾ inch extension); ASTM A1003, ASTM A653, Grade 50, Class 1, minimum base steel thickness: 14 gauge. Provide angles with manufacturer's standard G90, hot-dip galvanized protective coating. Angles installed under Section 092116. Coordinate with - Head of Wall Fire Rated Assemblies.
- F. Top of Rated Partitions Which Are Parallel to Deck Flutes: Provide ASTM A1003 and ASTM A653 steel plate, minimum base steel thickness: 0.0428 inch (18 gage). Provide steel plates in widths to span two or three metal deck ribs with at least 3 inch projection beyond runner track on either side; plates shall be continuous across top of partitions. Provide plates with galvanized protective coating.

- G. Carrying Channels: AISI SS220 and ASTM C754; 1-1/2 inch deep main runner channels, Cold formed, commercial steel sheet with a base steel thickness of 0.0538 inch and minimum 1/2 inch wide flanges; provide channels with manufacturer's standard rust inhibitive prime finish for interior areas, ASTM A1003 and ASTM A653 , G90 (Z275) hot dipped galvanized finish for exterior areas.
- H. Furring Channels: 0.0538 inch base steel thickness, with minimum 1/2 inch wide flanges, 3/4 inch deep cross furring channels, cold rolled steel channels, weighing 0.475 pounds per foot; provide channels with manufacturer's standard rust inhibitive prime finish for interior areas, ASTM A1003 and ASTM A653 , G90 (Z275) hot dipped galvanized finish for exterior areas.
- I. Wire: ASTM A641, carbon steel wire, galvanized, soft annealed, with Class 1 coating; hanger wire minimum 12 gage; wire for tying channels minimum 16 and 18 gage as specified.
- J. Screws: Products of, or as recommended by stud manufacturer and meeting ASTM C1002.
- K. All other materials not specifically described but required for a complete installation of metal framing shall be in accordance with the recommendations of the manufacturer of framing materials used.

2.4 RELATED MATERIALS

- A. Acoustical Sealant Tape: CRL Norseal Acoustical Sealant V-738, or approved equal; tape 1 inch wide by 1/4 inch thick. Provide tape for underside of floor runner tracks and where specified and at top tracks of ceiling height partitions.
- B. Acoustical Sealant: Refer to Section 079200.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 013100 - Project Management and Coordination: Coordination and project conditions.
- B. Verify rough-in utilities are in proper location.

3.2 INSTALLATION OF STEEL FRAMING, GENERAL

- A. Steel Framing Installation Standard: Comply with ASTM C754.
 - 1. Gypsum Board Assemblies: Also comply with requirements in ASTM C840 that apply to framing installation.
- B. Install supplementary framing, blocking and bracing at terminations in work and for support of fixtures, equipment services, heavy trim, grab bars, toilet accessories, door bumpers, furnishings and similar construction to comply with details indicated.
- C. Isolate steel framing from building structure to prevent transfer of loading imposed by structural movement, at locations indicated below to comply with details shown on drawings.

1. Where suspended ceiling assemblies abut building structure horizontally at ceiling perimeters or penetrations of ceiling.
2. Where partition and wall framing abut overhead structure.
 - a. Provide slip or cushioned type joints to attain lateral support and avoid axial loading.
- D. Do not bridge building expansion and control joints with steel framing or furring members, independently frame both sides of joints with framing or furring members or as indicated.

3.3 INSTALLATION OF STEEL FRAMING FOR WALLS AND PARTITIONS

- A. Install runners (tracks) at floors, ceilings and structural walls and columns where gypsum board stud system abuts other construction.
 1. Use proprietary tracks for non-rated and fire rated walls and partitions.
 2. Install studs full height for all partitions unless noted otherwise.
- B. Installation Tolerances: Install each steel framing and furring member so that fastening surface does not vary more than 1/8 inch from plane of faces of adjacent framing.
- C. Extend partition framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at or just above suspended ceilings. Continue framing over frames for doors and openings and frame around ducts penetrating partitions above ceiling to provide support for gypsum board.
 1. Cut studs 1/2 inch short of full height to provide perimeter relief.
 2. Install bridging/spacing bar.
- D. Bracing of partition framing not extending full height to structure above: Provide engineered calculations and shop drawings per the deferred submittal/bidder design requirements and meeting the loading requirements Section 092216, par 2.1.A.1.
- E. Terminate partition framing at suspended ceilings where indicated.
- F. Install steel studs and furring in sizes and at spacings indicated.
 1. Space studs 16 inches oc., unless otherwise indicated.
- G. Double stud frame door openings not more than 2 inches from each side of opening and to comply with details indicated. Attach vertical studs at jambs with screws either directly to frames or to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.
 1. Extend vertical jamb studs through suspended ceilings and attach to underside of floor or roof structure above.

- H. Double stud frame openings other than door openings not more than 2 inches from each side of opening and to comply with details indicated or in same manner as required for door openings; and install framing below sills of openings to match framing required above door heads.
- I. Install thermal insulation vertically and hold in place with Z-furring members spaced at 24 inches oc.
 - 1. Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails or screws designed for masonry attachment, spaced at 24 inches oc.
 - 2. At exterior corners attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw attach short flange of furring channel to web of attached channel. Start from this furring channel with standard width insulation and continue in regular manner.
 - 3. At interior corners, space second member no more than 12 inches from corner and cut insulation to fit.

3.4 ERECTION TOLERANCES

- A. Section 014000 - Quality Requirements: Tolerances.
- B. Maximum Variation From Indicated Position: 1/8 inch in 10 feet.
- C. Maximum Variation From Plumb: 1/8 inch in 10 feet.

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

- A. In general, the principal items of work include, but are not limited to, the following:

1. Preparation of surfaces, priming and finish coats.

1.2 SUBMITTALS

- A. General: Make submittals in accordance with Section 013300 - Submittal Procedures.
- B. Product Data: Submit complete list of products proposed for use, including technical data on each product to verify compliance; organize list to indicate painting systems to be used with each substrate.
1. Organize the paint submittal to follow the format in Part 2 of this Section in order to indicate painting systems to be used with each substrate.
 2. Submittal shall contain any proposed revisions to specifications (i.e. surface preparation, method of application, etc.) which contractor feels are necessary in their execution of the Contract.
 3. Any proposed revisions must be approved by the Architect prior to proceeding with the Work.
- C. Submit paint manufacturer's product data sheets and Environmental Data Sheets highlighting VOC limits for each paint or coating used in the building.
- D. Samples: Using approved materials, prepare and submit samples of each type of finish, gloss, and color for approval. Label samples with color number, name and date. Provide one (1) samples each.
1. Prepare paint color samples on 8-1/2 inch by 11 inch heavy, durable non porous paper.
 2. Furnish additional samples as required until colors and finishes are approved.
 3. Provide a list of materials and applications for each coat of each sample. Label each sample for location and application.
- E. Submit samples on the following substrates for the Architect's review of color and texture only:
1. Ferrous Metal: Provide one 4-inch square sample of flat metal and one 8-inch long sample of solid metal for each color and finish.
- F. Qualification Data: For firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- G. Section 017700 - Closeout Procedures.

1. Include a Paint Project Summary with finish schedule, including detail designating where each product/color/finish was used, Product Data pages, Material Safety Data Sheets, care and cleaning instructions, touch-up procedures, and color samples of each color and finish used.

1.3 QUALITY ASSURANCE

A. Single Source:

1. To the maximum extent practicable, select a single manufacturer to provide all materials required by this Section, using additional manufacturers to provide systems not offered by the selected principal manufacturer.
2. For each individual system, provide primer and other undercoat paint produced by same manufacturer as finish coat. Use only thinners approved by paint manufacturer and use only within recommended limits.
3. Contractor grades are not acceptable.

B. Applicator Qualifications: Engage an experienced applicator who has completed painting system applications similar in material and extent to that indicated for this project with a record of successful in-service performance. The contractor is to have a foreman on site during preparation and painting work.

C. Visual Standards: Each distinct area of the finished Work shall be free of variations in color and sheen, runs, sags, holidays, blistering, checking, cracking, scratches and other signs of poor workmanship.

D. Pre-Work Meeting

1. Convene minimum one week prior to commencing work of this section.

1.4 DELIVERY, STORAGE AND HANDLING

A. General: Comply with requirements specified in Section 016000 - Product Requirements.

B. Deliver materials to building in sealed, original, labeled containers bearing manufacturer's name, type of material, brand name, color designation, and instructions for mixing and thinning.

C. Store materials in tightly covered containers when not in actual use in a place specifically assigned for that purpose which is well-ventilated, dry and out of direct sunlight. Store materials in a manner so as not to exceed the manufacturer's temperature limitations.

1. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily. Take necessary measures to ensure that workers and work areas are protected from fire and health hazards resulting from handling, mixing and application.

1.5 PROJECT CONDITIONS

- A. Lighting: Do not proceed with work under this section unless adequate lighting is available. Provide lighting level of at least 50 candlepower per square foot, measured mid-height at substrate surface.
- B. Ventilation: Provide adequate ventilation as required for the type of paint and cleaning materials used. If necessary, consult paint manufacturer for recommendations.
- C. Protection: Protect surrounding areas against damage due to painting operations. At a minimum, surrounding areas shall be covered with polyethylene sheeting and waterproof masking tape. The Owner shall not be responsible for Contractor's selection or method of protection.
 - 1. Protective coverings shall be secured against wind and shall be vented to prevent collection of moisture on covered surfaces.
 - 2. Provide "wet paint" signs as required to protect newly painted surfaces.
- D. Precautions: Take all precautions to prevent fire; open containers of inflammable materials only when needed; keep rubbing cloths and oily rags in tightly closed containers and remove from site daily. Dispose of hazardous materials in accordance with all local, State and Federal regulations.

1.6 TESTING FOR ADHESION

- A. Field Testing: Field test primers which are to be applied. The purpose of this field testing will be to ensure compatibility and total adhesion of the materials to the various substrates. Notify Architect if results of any test are not in total conformance with the paint manufacturer's specifications. Commencement of work constitutes full responsibility for any resulting unsatisfactory finish.

1.7 MAINTENANCE

- A. Extra Materials: Furnish Owner with an additional 1 gallon of each material and color applied along with color book.

1.8 WARRANTY

- A. Warrant and guarantee the work of this section against failure or non- performance for one year from the date of substantial completion. Failure or non-performance shall be corrected promptly upon discovery by the owner. Correction work will follow project specifications.
- B. Warranty not applicable for failure of substrates, or work by others.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Sherwin-Williams Company, Tel. 1-800-321-8194 (Technical Hotline), Website <http://www.sherwin-williams.com>
- B. Benjamin Moore, Tel. 1-800-642-5678 Ext. 2217, Website <http://www.benjaminmoore.com>

- C. PPG Architectural Coatings, Website: <http://www.ppgac.com/>
- D. Miller Paints, Website: <http://www.millerpaint.com/>
- E. Rodda/Cloverdale Paint Company, Website <http://www.rodmapaint.com>
- F. Substitution Requests: Submit for acceptance under provisions of Section 012500.

2.2 PAINT MATERIALS

- A. Material Compatibility: Provide block fillers, primers, undercoats and finish-coat materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
- B. Material Quality: Provide manufacturer's best-quality paint material of the various coating types specified. Paint-material containers not displaying manufacturer's product identification will not be acceptable.
- C. VOC Compliance:
 - 1. General Emissions Evaluation: Interior products must be tested and determined compliant in accordance with the California Department of Public Health (CDPH) Standard Method v1.2–2017 or the most current version, using the applicable exposure scenario.
 - 2. VOC Content Requirements for Wet Applied Products: All paints and coatings wet-applied on site must meet the applicable VOC limits of the California Air Resources Board (CARB) 2007, Suggested Control Measure (SCM) for Architectural Coatings or the South Coast Air Quality Management District (SCAQMD) Rule 1113.
- D. Paint Content Restrictions:
 - 1. All interior latex paints and coatings must be free of alkylphenol ethoxylates (APEs). This means paint products do not contain intentionally added or unintentionally added/residual APEs (above 100 ppm) using, at a minimum, the list of CAS#s in Pharos:
<https://pharosproject.net/chemicals/2089943#hazards-panel>
 - 2. Epoxy paint should avoid bisphenols including BPA and BPS.
 - 3. Products with antimicrobials marketed with a health claim are not acceptable.
- E. Gloss levels: Confirm with Architect.
 - 1. General gloss level for predominant wall surfaces (gypsum board): eggshell or equal.
- F. Exterior Surfaces:
 - 1. Galvanized Metal: Doors and frames
 - a. One Primer Coat: Water Based Corrosion Resistant Primer.

- 1) Sherwin Williams: Pro Industrial Pro-Cryl Universal Primer B66W01310 (<100 g/L VOC).
 - 2) PPG Paints: Pitt-Tech Plus EP Acrylic Primer, 90-1912.
 - 3) Benjamin Moore: Acrylic Metal Primer HP 1100.
 - 4) Rodda: 4087 Series Protech Metal Master Universal Primer.
 - 5) Miller Paint: Acrimetal DTM Primer Interior Exterior 5000.
- b. Two Finish Coats: Water Based Light Industrial Polyurethane Gloss, resistant to light abrasion and softening by constant hand contact.
- 1) Sherwin Williams: Pro Industrial Waterbased Alkyd Urethane Enamel B53-11150 Series. (<50 g/L).
 - 2) PPG Paints: Pitt-Tech Plus EP Int/Ext DTM Finish Semi-Gloss, 90-1610.
 - 3) Benjamin Moore: Corotech COMMAND Waterborne Acrylic Urethane Gloss V390.
 - 4) Rodda 4545 Series Renaissance Interior/Exterior Waterborne Alkyd Urethane Hybrid Enamel Series.
 - 5) Miller Paint: Acrimetal DTM Semi Gloss Interior/Exterior 5200.
 - 6) Note: Comply with manufacturer's wash and etch/surface preparation instructions.

G. Interior Surfaces

1. Gypsum Wallboard: Typical walls and ceilings.
 - a. One Primer Coat: Top commercial grade zero VOC GWB primer.
 - 1) Sherwin Williams: ProMar 200 Zero VOC Primer B28 Series.
 - 2) PPG Paints: 6-4900XI Speedhide Zero Interior Zero VOC Latex Sealer.
 - 3) Benjamin Moore: Ultra Spec 500 Interior Primer N534.
 - 4) Rodda: 403601 Master Painter Zero.
 - 5) Miller Paint: Acrylitex MPI 50 Primer/Sealer.
 - b. Two Finish Coats: Top commercial grade zero VOC latex, Eggshell.
 - 1) Sherwin Williams: ProMar 200 Eg-Shel, B20-2600.
 - 2) PPG Paints: Speedhide Zero Interior Zero VOC Latex Eggshell, 6-5310

- 3) Benjamin Moore: Ultra Spec 500 Interior N538, Eggshell.
 - 4) Rodda: 4236 Series Master Painter Zero
 - 5) Miller Paint: Performance Plus Eggshell Interior Latex 1303.
2. Gypsum Wallboard: Wet area walls and ceilings including toilet rooms, janitor closets, and other areas subject to increased moisture and/or cleaning.
- a. Primer: Top commercial grade zero VOC GWB primer.
 - 1) Sherwin Williams: ProMar 200 Zero VOC Primer B28 Series. (VOC's: 0 g/L.)
 - 2) PPG Paints: 6-4900XI Speedhide Zero Interior Zero VOC Latex Sealer.
 - 3) Benjamin Moore: Ultra Spec 500 Interior Primer N534.
 - 4) Rodda: 403601 Master Painter Zero.
 - 5) Miller Paint: Acrylitex MPI 50 Primer/Sealer.
 - b. Two Finish Coats: Single component high performance water based epoxy modified acrylic, Semi-gloss.
 - 1) Sherwin Williams: Pro Industrial Pre-Catalyzed Waterbased Epoxy Semi-Gloss K46 Series. (VOC's: 150 g/L.)
 - 2) PPG Paints: 16-510 Pitt-Glaze WB1 Interior Semi-Gloss Pre-Catalyzed Water-Borne Acrylic Epoxy.
 - 3) Benjamin Moore: Pre-Catalyzed Waterborne Epoxy — Semi- Gloss HP3410. .
 - 4) Rodda: 4490 Series ProTech PreCat WB Epoxy Semigloss.
 - 5) Miller Paint: 16-510 Pitt-Glaze WB1 Interior Semi-Gloss Pre-Catalyzed Water-Borne Acrylic Epoxy.
3. Ferrous Metal: Including factory primed Doors and Frames
- a. One Primer Coat: Prime unprimed, bare metal (only), with water based corrosion resistant primer.
 - 1) Sherwin Williams: Pro Industrial Pro-Cryl Universal Primer B66W00310 (<100 g/L VOC).
 - 2) PPG Paints: Pitt-Tech Plus EP Acrylic Primer, 90-1912.
 - 3) Benjamin Moore: HP Acrylic Metal Primer HP1100/.
 - 4) Rodda: 4087 Series Protech Metal Master Universal Primer.

- 5) Miller Paint: Acrimetal DTM Primer Interior Exterior 5000.
- b. Two Finish Coats: Light industrial water based coating, Semi-Gloss, resistant to harsh cleaners, light abrasion and softening by constant hand contact.
 - 1) Sherwin Williams: Pro Industrial Pre-Catalyzed W/B Epoxy Semi-Gloss K46 Series (141 g/L VOC).
 - 2) PPG Paints: 16-510 Pitt-Glaze WB1 Interior Semi-Gloss Pre-Catalyzed Water-Borne Acrylic Epoxy.
 - 3) Benjamin Moore: Pre-Catalyzed Waterborne Epoxy Semi-Gloss HP3410.
 - 4) Rodda: 4490 Series ProTech Pre
 - 5) Miller Paint: Waterborne Epoxy Semi Gloss 183-5-10.
4. Colors: Each paint color must be accurately mixed to ensure color continuity. No allowance will be granted for mis-matched paint of the same color when viewed under normal lighting conditions. Match existing colors.
- H. Provide primer and finish coats which are compatible with each other and with prime coats provided under other Sections. Provide barrier coats over incompatible primers or remove and re-prime as required.
- I. Tint each undercoat a lighter shade than finish coat so that numbers of coats can be easily discerned. No color mixing will be allowed at the job-site.
- J. Thinner: Type as recommended by the paint manufacturer. Use thinner only when recommended by the paint manufacturer, and then only in a quantity as indicated on the label.
- K. Primers: Primers, except metal primers, shall be white in color for inspection purposes.
- L. Secondary Products: Secondary products not specified by name and required for the job such as shellac, oils, patching compounds, putty, etc., shall be "best grade" products.

PART 3 EXECUTION

3.1 EXAMINATION

- A. General: Examine surfaces to receive paint finish for conditions that will adversely affect execution, performance, or quality of work and which cannot be put into an acceptable condition through reasonable preparatory work as specified herein.
 1. Surfaces which are unfit to receive the work of this section shall be repaired, replaced or re-finished such that they are acceptable and such that the work of this section may be done as specified. It shall be the responsibility of the General Contractor to ensure that these provisions are strictly enforced.

2. Commencement of Work constitutes acceptance of surfaces and conditions.

3.2 SURFACE PREPARATION (GENERAL)

- A. General: Surface preparations and cleaning procedures shall be in strict accordance with the instructions and specifications of the paint manufacturer and with the requirements of this specification.
- B. Removal of Fixtures: Cooperate with other trades and coordinate removal of fixtures, hardware items, and equipment, as required for painting work. Items to be removed on surfaces to be painted include: switch and receptacle plates, escutcheons and like plates, surface-mounted equipment, free-standing equipment which blocks access to painting surfaces, grilles and louvers at duct openings into finished spaces, and other items as required and directed.
- C. Painting of Factory-Primed Door Hardware: Prior to painting, mask all operating parts so that item works freely after paint is dry. Remove any excess paint from operating parts and clean and free-up the operation of any parts which do not operate smoothly due to the painting operation.
- D. Pre-Cleaning: Remove oil and grease prior to mechanical cleaning as hereinafter specified by methods outlined in SSPC-SP 1 "Solvent Cleaning."

3.3 SURFACE PREPARATION

- A. Uncoated Ferrous Metal: For interior metals not requiring paint, surfaces are to remain as received from the factory.
- B. Shop-Coated Ferrous Metal: Thoroughly degrease surfaces and clean using solvent (SSPC-SP 1). Remove loose rust, blistered and peeling paint to bare metal by scraping, sanding, wire brushing, or other abrasion methods in accordance with SSPC-SP 2 or SP 3; feather edges of adjacent sound paint. Dull glossy surfaces by scuff-sanding and wipe down. Spot-prime all abraded portions, rust areas, and bare surfaces with specified primer on same day of surface preparation. Finish prime after spot priming has dried thoroughly.
- C. Galvanized Metal: Clean surfaces to remove factory films and oily residue as recommended by the paint manufacturer. Responsibility for insuring that the surface is properly prepared rests with the painting sub-contractor. Clean galvanized metal the same day to be painted.
- D. Gypsum Wallboard: Remove all dust and dirt with a brush; if necessary, clean surfaces using damp rags or sponges. Repair of surface defects is specified in Section 092116.

3.4 CLEANING PRIOR TO PAINTING

- A. Remove dust and loose deleterious materials from all surfaces before beginning painting operations. Program the cleaning and painting so that dust and other contaminants from the cleaning process will not fall in wet, newly painted surfaces.

3.5 APPLICATION OF PAINT

- A. Mixing: Mix paint materials in accordance with the manufacturer's instructions and directions. Mix often enough during application to keep the paint uniform and to ensure complete dispersion of pigment and a uniform composition.
 - 1. Prepare multiple component coatings using all of the contents of the container for each component as packaged by the manufacturer. Mixing of partial kits will not be permitted. Multiple component coatings that have been mixed shall not be used beyond their pot life. Only the components specified and furnished by the manufacturer, including thinner if required, shall be mixed.
- B. Application: Apply paint in accordance with the manufacturer's directions. Use techniques best suited for substrate and type of material being applied. Brushes and rollers shall be of a type best suited for the type of material being applied.
 - 1. Apply intermediate and finish coats within the manufacturer's recommended top coating time periods.
 - 2. When applying paint to drywall, use a roller nap no greater than 3/8 inch so as to achieve a light stipple finish.
 - 3. Brush and level out paint applied to metal door frames to achieve a nearly sprayed-on appearance.
 - 4. If metal doors are not sprayed, finish may be applied with 1/4 inch nap roller.
- C. Apply each coat of paint as a continuous film of uniform thickness, free from holidays, sags, crawls, pinholes, blisters, unevenness in color, or other evidence of poor workmanship. Repaint thin spots or areas missed in the application and allow to dry before applying next coat of paint.
 - 1. Give special attention to ensure that surfaces, such as edges, corners, crevices, welds and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
 - 2. Each coat shall be free of dirt, dust, moisture, etc., prior to application of next coat.
- D. Allow each coat of paint to thoroughly dry, full thickness of the film, before application of the succeeding coat. Paint is considered dry for recoating when the next coat can be applied without the development of any detrimental film irregularities such as wrinkling, lifting, or loss of adhesion of the previous coat.
- E. Coverage for each paint material is specified as either the total minimum dry film thickness in mils, or the spreading rate in square feet per gallon over the surface designated. Actual coverage rate will vary depending upon the texture and porosity of the surface, climatic conditions, etc.
 - 1. The number of coats specified is the minimum required, irrespective of the coating thickness.

2. In the event the required paint thickness is not achieved, apply additional coats until the required thickness is obtained.
 3. Do not exceed manufacturer's recommended maximum film build-up per coat (wet mils).
- F. Recoat primed and sealed walls and ceilings where there is evidence of suction spots or unsealed areas in first coat to ensure a finish coat with no burn-through or other defects.
 - G. Sand lightly between coats of enamel to produce an even, smooth finish. Wipe to remove dust before recoating.
 - H. Make edges of paint adjoining other materials or colors clean and sharp with no overlapping.
 - I. Do not paint over any code-required labels or any equipment identification or nomenclature plates.
 - J. Tops and bottoms of metal doors shall be finished the same as the faces (primed and two finish coats of painted).

3.6 DAMAGED PAINT SURFACES

- A. General: Before final acceptance of the work by the Architect, repair or re-finish painted surfaces which have been damaged at no additional cost. Refinish whole wall where portion of finish is not acceptable.
- B. Painted Structural Steel: Areas of chipped, peeled, or abraded paint shall be hand or power sanded, feathering the edges. Prime and finish coat the areas using the same material as originally scheduled. Depending on the extent of repair and its appearance, an overall finish coat may be required by the Architect to achieve uniform appearance.

3.7 CLEAN-UP

- A. General: During the progress of the work, remove from the project all discarded paint materials, rubbish, cans and rags. Leave premises clean and in orderly condition.
- B. Cleaning: Upon completion of painting work, clean window glass and other paint-spattered surfaces. Remove spattered paint by proper methods of washing and scraping, using care not to scratch or otherwise damage finished surfaces.

3.8 PROTECTION

- A. Protect work of other trades, whether being painted or not, against damage by painting. Correct damage by cleaning, repairing or replacing, and repainting, as approved by Architect.
- B. Remove temporary protective wrappings after completing painting operations.

END OF SECTION

DIVISION 22

PLUMBING

PART 1 GENERAL

1.1 CONDITIONS AND REQUIREMENTS

- A. Refer to Divisions 00 & 01 of these specifications, which govern work under Division 22. Refer to other sections of these specifications for additional related requirements.

1.2 SCOPE OF REQUIREMENTS

- A. The work covered by Division 22 of the specifications shall include but not limited to furnishing all materials and supplying all labor, equipment, and services to install the complete Division 22 systems as shown on the accompanying drawings and specified herein.
- B. Work done under Divisions 22 of the specifications shall comply with the requirements specified herein.

1.3 CODES, PERMITS AND FEES

- A. Division 22 work shall be in accordance with the following as adopted by the governing agencies, including amendments:
 - 1. Americans with Disabilities Act (ADA)
 - 2. Applicable State and Local Codes and Ordinances
 - 3. National Electrical Code
 - 4. International Building Code
 - 5. International Fire Code
 - 6. International Mechanical Code
 - 7. Uniform Plumbing Code
 - 8. Washington State Non-Residential Energy Code
 - 9. Washington State Boiler and Unfired Pressure Vessel Code
 - 10. International Fuel Gas Code
- B. Permits and inspections required for the Division 22 work on this project shall be obtained as part of the Division 22 scope of work, and the cost for these permits and inspections shall be included in the Division 22 bid. All inspection certificates shall be delivered to the Owner's Representative prior to final acceptance of the work in accordance with the requirements of these specifications.
- C. All costs levied by utility companies and/or governing agencies associated with water, gas, sanitary and storm sewer connections shall be included in the Division 22 scope of work and shall be included in the Division 22 bid. This shall include but not limited to tap fees, service mains, meter and vault charges, valves, etc.
- D. Work shall comply with all regulations associated with all applicable utilities.

1.4 INTENT AND INTERPRETATIONS

- A. It is the intent of these plans and specifications to result in a complete and working Division 22 installation in complete accordance with all applicable codes and ordinances.
- B. The drawings and these specifications are intended to supplement each other. Any details contained in either the drawings or these specifications shall be included as if contained in both.

- C. Items not specifically mentioned in the specifications or noted on the drawings, but which are obviously necessary to make a complete working installation shall be included.

1.5 DEFINITIONS

- A. The term "Acceptance", when used in Division 22, shall be defined as the Owner's assumption of ownership for part or all of the Division 22 system. Acceptance of part or all of the Division 22 system, when granted prior to completion of Division 22 work and/or correction of deficiencies, shall not relieve Division 22 of any responsibility for completion of this work and/or correction of these deficiencies.
- B. The term "Date of Acceptance", when used in Division 22, shall be the official date when Acceptance, as defined in these specifications, occurs. The Date of Acceptance shall be assumed to coincide with granting of Substantial Completion unless noted otherwise by the Owner's Representative. Deviation of the Date of Acceptance from Substantial Completion can assume to have occurred only when written documentation is provided by the Owner's Representative specifically indicating this separation and identifying an alternative designation for the Date of Acceptance.
- C. The terms "The Contractor" or "This Contractor", when used, shall be defined as the Contractor responsible for Division 22 work.
- D. The term "Owner's Representative", when used, shall refer to the Architect or their designated representative in accordance with Division 00 and 01.
- E. The term "Provide" shall mean furnish and install.
- F. The term "Mechanical", when used, to distinguish a particular scope of work or portion of the documents, shall mean the Division 22 scope of work and Division 22 documents (drawings and specifications) respectively.

1.6 DRAWINGS

- A. Plumbing/Mechanical drawings show general arrangement of piping, ductwork, equipment, etc. Drawings shall be followed as closely as actual building construction and work of other trades will permit.
- B. Architectural and Structural drawings and specifications shall be considered part of this work insofar as they furnish information relating to design and construction of the building. These documents take precedence over Division 22 drawings and specifications if any dimensional discrepancies exist.
- C. Division 22 drawings are diagrammatic only. Consequently, all required duct and pipe offsets are not indicated on the drawings. Offsets as required to meet the design intent of the drawings shall be provided.

1.7 GUARANTEE (REFER TO DIVISIONS 00 AND 01)

- A. The Division 22 equipment, materials, and installation shall be guaranteed for a period of one (1) year unless an individual item or specification is otherwise noted as longer. All defects in Division 22 work and/or equipment furnished that develop at any time during the one year guarantee period shall be corrected at no cost to the owner, including any expenses for cutting, patching, and repairing made necessary by corrections of unsatisfactory work and/or damage resulting from incorrect equipment operation.

- B. The guarantee period shall begin upon the Date of Acceptance. When Acceptance is granted for portions of the Division 22 system at different times, the guarantee for each portion of the Division 22 system shall begin upon Acceptance of that portion of the Division 22 system.
- C. Permission to use the permanent Division 22 system for temporary heating during construction does not constitute acceptance. All product and system warranties shall be extended at no cost to the Owner as required to maintain this one (1) year requirement from the Date of Acceptance if such permission is given.
 - 1. Exception: Use of part or all of the Division 22 system prior to the Date of Acceptance, when initiated by the Owner, shall constitute Acceptance of the specific piece of equipment and/or portion of the system only when acknowledgement of Acceptance is noted in written authorization from the Owner as required in these specifications.

1.8 COST BREAKDOWN

- A. Refer to Divisions 00 and 01 for supplemental requirements.
- B. A breakdown of the plumbing construction cost shall be furnished to the Owner's Representative within 30 days of Notice to Proceed, with separate costs for each of the items listed in the cost breakdown identified in Part 4 at the end of this section.

1.9 PAYMENT REQUESTS

- A. Refer to Divisions 00 and 01 for supplemental requirements.
- B. Payment requests for materials and equipment will not be reviewed or approved until submittals and operation and maintenance data have been received and approved.

1.10 USE OF EQUIPMENT DURING CONSTRUCTION

- A. The mechanical room and air handling unit equipment shall not be used to store construction or waste materials.
- B. Temporary heating for the facility during the construction phase shall not be supplied by the permanent system installed under Division 22 unless Contractor shall obtain a letter of approval from the Owner stating that they understand equipment expected life may be shortened due to severe usage.
- C. If the Contractor is given permission to use permanent systems for space heating during construction:
 - 1. Product warranties shall be extended as required to account for construction use. Warranty periods offered by equipment manufacturers and/or required by these specifications shall begin at the Date of Acceptance. If equipment manufacturers require that the warranty period begin with use of equipment during construction, the Contractor shall bear the expense of extending all such warranties to maintain the required warranty period beyond the Date of Acceptance.

PART 2 PRODUCTS

2.1 EQUIPMENT AND MATERIALS – STANDARDS AND CODES

- 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. Outdated "new" equipment is not acceptable. Each item of equipment and material 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. Motor and equipment name plates as well as applicable UL and AGA labels shall be in place when Project is turned over to the Owner.
 - C. Equipment shall be UL listed as an assembly where listing/labeling program is available for that type of equipment.
 - D. All piping, fittings, valves, fixtures, faucets and equipment containing or conveying potable water shall comply with the latest US Safe Drinking Water Act mandating any wetted surface of the above mentioned items shall not contain above 0.25% lead content by weighted average. All piping, fittings, valve and equipment containing or conveying potable water shall comply with NSF 61 G and NSF 372 or shall be provided with indication on submittals the manufacturer's declaration of self-certification.

2.2 EQUIPMENT/MATERIAL SUBSTITUTIONS

- A. 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.
- B. Substitutions will not be permitted without written approval. (Refer to Divisions 00 and 01.)
- C. Where two or more manufacturer designations are listed in these specifications, choice will be optional with the Contractor except that where more than one manufacturer is listed and only one manufacturer's catalog number is specified or only one manufacturer 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).
- D. Substituted equipment with efficiencies less than 95 % of the basis of design efficiency shall not be considered equal to the basis of design.
- E. If the Division 22 Contractor uses manufacturers other than the basis of design, the Contractor shall be responsible for:
 - 1. Insuring the substituted item will fit the available space while allowing proper maintenance access
 - 2. Any changes required by other Contractors caused by the substituted equipment
- F. In the event other than specified equipment is used and will not fit job site conditions, this Contractor shall assume responsibility for replacement with items indicated as the basis of design.
- G. Substitutions not approved during bid will not be accepted.

2.3 SUBMITTALS FOR REVIEW

- A. Refer to Divisions 00 and 01 for supplemental requirements.
- B. Shop drawings, catalog information and material schedules shall be submitted for approval on all specified materials and equipment in Division 22 prior to ordering.

- C. Furnish complete shop drawing/catalog data for equipment and materials to be used in the work for review. Allow sufficient time for developing shop drawings, processing and review time so that the installation will not be delayed.
- D. Shop drawings shall be reviewed, approved and stamped by the Contractor prior to submitting to Owner's Representative for approval. Submittals without such approval will be returned without review.
- 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. State sizes, capacities, brand names, motor horsepower, electrical characteristics, accessories, materials, gauges, dimensions, and other pertinent information.
- G. Underline applicable data.
- H. If material or equipment is not as specified or submittal is not complete, it will be rejected. Only complete submittal including all applicable specification sections will be reviewed.
- I. Field applied adhesives, sealants, fillers, primers, glues, and paint shall meet or exceed the requirements as identified in part 3 of this section.
- J. Provide cut sheets and a Material Safety Data Sheet (MSDS) for each field applied sealant, adhesive, coating, paint etc used in the building, highlighting VOC limits and chemical component limits. Also indicated in addition to actual VOC emissions identify allowed limits of each product to demonstrate compliance. Submit all proposed field applied products as a single submittal for review with their MSDS data.
- K. Catalog data or shop drawings for equipment which are noted as being reviewed shall not supersede Contract Documents.
- L. Review comments shall not relieve the 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.
- M. Check work described by catalog data with Contract Documents for deviations and errors.
- N. Shop drawings and submittal information shall be provided for all required Division 22 equipment in a single submittal. All Division 22 sections shall have a dedicated submittal and shall include all products with the section. Incomplete submittals will be rejected without review.
 - 1. Exceptions: At the discretion of the Owner's Representative, partial project submittals may be allowed.
- O. Submittal Format:
 - 1. Electronic submittals shall be provided with accordance with all of the following conditions. Electronic submittals which do not comply with all of these conditions will be rejected without review.
 - a. Electronic submittals shall be submitted in the current version of Adobe Portable Document Format (PDF)
 - b. Submittals shall be original PDF's of the document and shall not be created using scanned copies of paper documents.
 - c. PDF documents shall be searchable.

- d. PDF documents shall be unlocked
 - e. Electronic submittals shall be separated by specification section and identified as such. Submittals which combine multiple sections into a single document will be rejected.
 - f. Electronic submittals shall include a table of contents and each applicable section shall be bookmarked for easy access.
 - g. Electronic submittals shall be clearly marked in RED using boxes and arrows and other appropriate markings to indicate specific product information, option selections, accessories, etc.
- P. Each product shall be keyed to the paragraph number in the specifications.
- Q. Operation and maintenance data for individual equipment shall also be provided subsequent to approval of equipment submittals in a separate binder meeting the same requirements as the submittal binder. Refer to Part 3 of this section for supplemental requirements.
- R. All submittals and re-submittals as required shall be provided with a cover page incorporating a table similar to that provided at the end of this section. The appropriate box(es) shall be checked on each line item for all submittals.

PART 3 EXECUTION

3.1 LOCATIONS

- A. Coordination of Division 22 equipment and systems to the available space, with other trades and to 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 head room and pitch of sloping lines and avoid structural, electrical, pipe and duct interferences 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. Pipe and duct routing shall be coordinated and verified with all trades prior to fabrication and installation. Additional project costs resulting from failure to do so shall be the Contractor's responsibility.
- D. 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.
- E. Locations of equipment and devices, as shown on the drawings, are approximate unless dimensioned. Verify the physical dimensions of each item of Division 22 equipment to fit the available space and promptly notify the Owner's Representative prior to roughing-in if conflicts appear.
- F. All piping, wiring, equipment, ductwork, tubing, etc., shall be concealed within building construction unless otherwise noted, or in mechanical rooms.
- G. 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.
- H. 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 10 foot 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 their 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 their proposed excavation. Notify the 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 their failure to exactly locate and preserve underground utilities.

3.2 SCHEDULING

- A. It is understood that while drawings are to be followed as closely as circumstances permit, the Contractor shall be responsible for installation of systems according to the true intent and meaning of 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, secure approval from Owner's Representative for those changes before proceeding with work.
- B. The contractor shall coordinate with the work of various trades when installing interrelated work. Before installation of Division 22 items, proper provisions shall be made to avoid interferences. Changes required in work specified in Division 22 caused by neglect to do so shall be made at no cost to Owner.
- C. Supports and inserts in concrete required for Division 22 supports shall be furnished and installed in the Division 22 scope 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 22.

3.3 CUTTING AND PATCHING

- A. All cutting and patching of new and existing construction required for the installation of systems and equipment specified in Division 22, including patching of existing walls, floors, and roofs upon removal of existing Division 22 systems and equipment, shall be the responsibility of the Division 22 Contractor. All cutting shall be accomplished with masonry saws, drills or similar equipment to provide neat uniform openings.
- B. Walls, floors, ceilings and roof shall be patched and repaired 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.
- C. All cutting and patching made necessary to repair defective equipment, defective workmanship or be neglect of this Contractor to properly anticipate their requirements shall be included in Division 22.
- D. 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.
- E. Cutting, patching, repairing, and replacing pavement, sidewalks, roads, and curbs to permit installation of work specified or indicated under Division 22 is responsibility of Division 22.

3.4 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Refer to Divisions 00 and 01 for supplemental 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. The Contractor shall bear expenses arising from correcting deficiencies of work that do 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 (such as controls) in a dry, heated space.
- E. Notify Owner of equipment delivery dates twenty-four (24) hours in advance of delivery.
- F. The Contractor shall be responsible for protection of equipment furnished in Division 22 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.

3.5 VISITING THE PROJECT SITE

- A. The premises shall be examined and conditions shall be understood which may affect performance of work of Division 22 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.

3.6 TESTS

- A. See individual specification sections for Testing Requirements.

3.7 PROJECT CLOSEOUT/FINAL CLEANING

- A. Clean up all equipment, materials, cartons and other debris that is a direct result of the installation of equipment under this contract.
- B. Clean exposed piping, equipment, and fixtures. Repair damaged finishes and leave everything in working order.

3.8 PROJECT CLOSEOUT/RECORD DRAWINGS

- A. Provide in accordance with Division 01 and the requirements of this section.
- B. Record differences between mechanical work as installed and as shown in Contract Documents on a set of prints of mechanical drawings to be furnished by Owner's Representative. Return these prints to the Owner's Representative at completion of Project. Notations made on drawings shall be neat and legible. These drawings shall not be used for any other purposes.
 - 1. Coordination drawings and fabrication drawings may not be utilized as record drawings unless:

- a. Content from original drawings set such as notes and keynotes are transferred over to the coordination and fabrication drawings.
 - b. Drawings shall not be multidiscipline (ie plumbing and HVAC on same sheet) unless prepared that way in the construction documents.
 - c. Drawings clearly identify deviations/modifications to the construction documents.
- C. Refer to individual specification sections for additional requirements.

3.9 PROJECT CLOSEOUT/PUNCH LIST PROCEDURES

- A. The Contractor shall notify the Owner's Representative in writing when the project is ready for punch lists. The following items must be complete before punch list will be performed, and must be provided with written verification:
- 1. Systems are complete and functional, including controls and control interface with Section 23 09 23 control systems when specified or indicated on drawings.
 - 2. Testing and balancing is complete, and test and balance reports have been submitted for review.
 - 3. Operation and Maintenance Manuals are complete, and have been submitted for review.
- B. After punch lists are complete, written notice must be forwarded to the Owner's Representative requesting final checkout. Any additional trips beyond the final checkout required due to incomplete items on previous punch lists will be billed to the Contractor at normal rate plus travel expenses.
- C. At the time of initial and final observation, the project foreman shall accompany the observation party and shall remove access panels and perform other duties, as required, to allow complete observation of the entire Division 22 system.

PART 4 TABLES

4.1 COST BREAKDOWN

- A. Provide breakdown for the categories that follow. Each category shall identify separate costs for material and labor/installation.
- B. Category:
- 1. Mobilization
 - 2. Supervision
 - 3. Plumbing Rough-in

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Demolition and salvage within existing buildings

1.2 RELATED SECTIONS

- A. Section 22 05 00 – Common Work Results for Plumbing

1.3 PERFORMANCE REQUIREMENTS

- A. Contractor shall notify the Owner a minimum of seventy-two (72) hours in advance of any disruption to utility distribution systems.
- B. All connections to and disconnections from existing utilities such as gas, water, and sewer, etc. shall be coordinated with and approved by the Owner prior to proceeding with the work. Work shall be planned so as to minimize impact to areas not involved in ongoing construction. Where areas are not involved in ongoing construction are to be impacted, the contractor shall identify such areas, the extent to which they will be affected and the period of time for which they will be affected. Provide required temporary mechanical connections to accommodate the nature of this work.
- C. The contractor is advised that the above notification and scheduling requirement may necessitate rescheduling, partial completion and reconnection, overtime work at night or on weekends or delay of the work. Contractor costs incurred due to the above shall be included in the original bid price and shall not be the cause for additional claims or charges to the Owner.
- D. All new piping shall be installed, cleaned, tested, and sterilized (domestic water) prior to making connections to existing systems.
- E. Prior to connecting new domestic water piping to existing water piping, contractor shall test the existing domestic water to ensure it meets applicable health department standards. If this water quality is in non-compliance, contractor shall contact Owner's Representative for further direction. After connection of new and existing systems, Contractor shall be responsible for ensuring entire system meets Health Department water quality standards. The intent of this specification is to identify latent and unanticipated conditions.
- F. Small potable water piping additions may be sterilized by cleaning with chlorine solution prior to installation and flushing after installation. Certificate of approval from Health authority on entire system must be obtained.

1.4 DEMOLITION AND SALVAGE

- A. Demolition of existing mechanical systems and equipment in remodeled areas shall be provided under Mechanical.
- B. The Owner reserves first right of refusal for all materials and equipment designated for demolition or removal. All items refused by the Owner shall salvage to the Contractor.
- C. Systems and equipment to be removed and salvaged to the Contractor shall be removed from the site.

- D. Equipment and materials salvaged to the Owner shall be delivered to the Owner at on-site location.
- E. Visit the site prior to the bid date to determine the extent of required demolition.
- F. Schedule removal with the general contractor and sequence with other construction activities.
- G. If only portions of existing mechanical systems are indicated to be removed, Contractor shall cap piping flush with walls, floors, or ceilings to allow for refinishing (where applicable).

1.5 CUTTING AND PATCHING

- A. Refer to Section 22 05 00.

PART 2 (NOT USED)

PART 3 (NOT USED)

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. General Valves
- B. Gas Pressure Regulators

1.2 RELATED SECTIONS

- A. Section 22 05 00 – Common Work Results for Plumbing
- B. Section 22 05 53 – Identification for Plumbing Piping and Equipment
- C. Section 22 10 00 – Plumbing Piping

1.3 REFERENCES

- A. General Valves
 - 1. MSS SP-80 - Bronze Gate, Globe, Angle and Check Valves
 - 2. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends

1.4 SUBMITTALS FOR REVIEW

- A. Submit under provisions of Section 22 05 00.
- B. Product Data: Provide data on materials, valves, and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.

1.5 QUALITY ASSURANCE

- A. Valves: Manufacturer's name and pressure rating marked on valve body.

1.6 REGULATORY REQUIREMENTS

- A. All piping, fittings, valves, fixtures, faucets and equipment containing or conveying potable water shall comply with the latest US Safe Drinking Water Act mandating any wetted surface of the above mentioned items shall not contain above 0.25% lead content by weighted average. All piping, fittings, valve and equipment containing or conveying potable water shall comply with NSF 61 G and NSF 372 or shall be provided with indication on submittals the manufacturer's declaration of self-certification.

1.7 DELIVERY, STORAGE, AND HANDLING (REFER TO SECTION 22 05 00)

- A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
- B. Provide temporary protective coating on cast iron and steel valves.
- C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

- D. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

1.8 DRAWING SCHEDULES

- A. Refer to schedules on drawings for model numbers, symbols, etc. for additional information concerning products specified in this section.

PART 2 PRODUCTS

2.1 GENERAL VALVES

- A. Manufacturers (Refer to Section 22 05 00):
 - 1. Crane
 - 2. Jenkins
 - 3. Powell
 - 4. Milwaukee
 - 5. Grinnell
 - 6. Stockham
 - 7. Hammond
 - 8. Nibco
 - 9. Walworth
 - 10. Watts
 - 11. Apollo
- B. Ball Valves
 - 1. Up to and including 3 inches:
 - a. MSS SP-110, Class 150, 400 psi, bronze two piece body, chrome plated brass ball, regular port, Teflon seats and stuffing box ring, blow-out proof stem, lever handle, solder or threaded ends with union.
- C. Gas Valves
 - 1. Up to and including 2 inches:
 - a. Bronze butterfly valve: bronze body, lever handle, stainless steel disc and stem, viton seal, 175 psig WOG, MSS SP-67, AGA certified and UL listed for gas service.

2.2 GAS PRESSURE REGULATORS

- A. Manufacturers (Refer to Section 22 05 00):
 - 1. Fisher
 - 2. Jordan
 - 3. Rockwell
- B. Spring loaded with internal relief valve. Cast iron body rated for 150 psi (non- operational) with screened vent.
- C. Size, capacity and pressure requirements in accordance with drawings

PART 3 EXECUTION

3.1 PREPARATION

- A. Remove scale and dirt, on inside and outside, before assembly.

3.2 INSTALLATION – GENERAL

- A. Provide valves in accordance with manufacturer's instructions and as indicated on the drawings.
- B. Install valves with stems upright or horizontal, not inverted.
- C. Valves shall be line size unless indicated otherwise.

3.3 APPLICATION

- A. Provide ball valves for shut-off and to isolate equipment, part of systems, or vertical risers.

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Pipe Hangers and Supports
- B. Pipe Insulation Shields

1.2 RELATED SECTIONS

- A. Section 22 05 00 –Common Work Results for Plumbing
- B. Section 22 05 23 – General Duty Valves for Plumbing Piping
- C. Section 22 07 00 – Plumbing Insulation
- D. Section 22 10 00 – Plumbing Piping

1.3 REFERENCES

- A. General
 - 1. ASME B31.2 - Fuel Gas Piping
 - 2. ASME B31.9 - Building Services Piping
- B. Pipe Hangers and Supports
 - 1. ASTM F708 - Design and Installation of Rigid Pipe Hangers
 - 2. MSS SP58 - Pipe Hangers and Supports - Materials, Design and Manufacturer
 - 3. MSS SP69 - Pipe Hangers and Supports - Selection and Application
 - 4. MSS SP89 - Pipe Hangers and Supports - Fabrication and Installation Practices

1.4 SUBMITTALS FOR REVIEW (REFER TO SECTION 22 05 00)

- A. Product Data: Provide manufacturers catalog data including load capacity.
- B. Manufacturer's Installation Instructions: Indicate special procedures and assembly of components.

1.5 REGULATORY REQUIREMENTS

- A. Pipe Hangers and Supports
 - 1. Hanger and support systems shall conform to MSS SP58, MSS SP69, MSS SP89

1.6 RELATED WORK SPECIFIED IN OTHER SECTIONS

- 1. Supports for Medical Gas and Vacuum Systems: refer to section 22 60 01.

PART 2 PRODUCTS

2.1 PIPE HANGERS AND SUPPORTS

- A. Manufacturers (Refer to Section 22 05 00):

1. Grinnell/Anvil
 2. ERICO/Michigan Hanger
 3. Crane
 4. Fee and Mason
- B. Plumbing Piping – Water (Copper/Steel Pipe):
1. Conform to MSS SP58, MSS SP69, and MSS SP89.
 2. Hangers for Pipe Sizes ½ to 1½: Carbon steel, adjustable swivel, split ring.
 3. Wall Support for Pipe Sizes to 3 inches: Cast iron hook.
 4. Vertical Support: Steel riser clamp.
 5. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
 6. Swivel ring, clamps and all materials in contact with the pipe shall be plated to match copper pipe material.
- C. Natural Gas Piping Systems
1. Conform to MSS SP58, MSS SP69, and MSS SP89.
 2. Hangers for Pipe Sizes ½ to 8 inches: Carbon steel, plated adjustable swivel, ring.
 3. Vertical Support: Steel riser clamp.
 4. Swivel ring, clamps and all materials in contact with the pipe shall be plated to match copper or stainless steel pipe material.
- D. Pipe Riser Clamps
1. Steel and Cast Iron Pipe: Extension pipe or riser clamp; carbon steel; black or galvanized finish.
 - a. Basis of design: Grinnell Fig 261.
 2. Copper Pipe: Copper tubing riser clamp; carbon steel; copper finish.
 - a. Basis of design: Grinnell Fig CT-121.

2.2 HANGER RODS

- A. Hanger Rods: Mild steel threaded both ends, threaded one end, or continuous threaded.

2.3 PIPE INSULATION SHIELDS

- A. Manufacturers (Refer to Section 22 05 00):
1. Grinnell
 2. Fee & Mason
 3. M-Co
 4. Pipe Shields, Inc.
 5. Kin-Line
- B. Cold Piping: Insulation protection shield type; carbon steel; galvanized finish; Grinnell Fig 167.

PART 3 EXECUTION

3.1 GENERAL

- A. Install in accordance with manufacturer's instructions.
- B. Provide neoprene or approved wrap between water piping and metal building components, unistrut or other metal.

1. Exceptions:
 - a. Not required where piping is isolated from hangers with insulation shields.
 - b. Not required where resilient clamps are used.
 - C. Provide templates, anchor bolts, and accessories for mounting and anchoring to other divisions as applicable.
 - D. Construct supports of steel members. Brace and fasten with flanges bolted to structure.
 - E. Provide rigid anchors for pipes after vibration isolation components are installed.
- 3.2 PIPE HANGERS AND SUPPORTS
- A. Support horizontal piping in accordance with applicable codes and the table at the end of this section.
 - B. Install hangers to provide minimum ½ inch space between finished covering and adjacent work.
 - C. Place hangers within 12 inches of each horizontal elbow.
 - D. Use hangers with 1½ inch minimum vertical adjustment.
 - E. Support riser piping independently of connected horizontal piping.
 - F. Design hangers for pipe movement without disengagement of supported pipe.
 - G. Prime coat exposed steel hangers and supports. (Refer to division 9). Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.
 - H. Support risers independently of connected horizontal piping.
- 3.3 PIPE INSULATION SHIELDS
- A. Provide shields to protect pipe insulation at hangers. (Furnished and installed under Section 22 05 29.)
 - B. Size hangers to accommodate pipe insulation and insulation shields where applicable. See Section 22 07 00.
- 3.4 PIPE INSULATION INSERTS
- A. Furnished under Section 22 07 00, installed under Section 22 05 29.

PART 4 TABLES

Pipe Size (inches)	Max. Horizontal Spacing for Hangers (feet)			Hanger Rod Dia. (inches)
	Threaded or Welded Joints		Copper Tube and Piping (soldered, brazed or welded joints)	
	Steel (excluding gas)	Steel (gas)		
1/2	10	6	6	3/8
3/4	10	8	6	3/8
1	10	8	6	3/8

Pipe Size (inches)	Max. Horizontal Spacing for Hangers (feet)			Hanger Rod Dia. (inches)
	Threaded or Welded Joints		Copper Tube and Piping (soldered, brazed or welded joints)	
	Steel (excluding gas)	Steel (gas)		
1¼	10	10	6	3/8
1½	12	10	6	3/8
2 to 3	12	10	10	½
4 to 6	12	10	10	5/8
8 to 12	12	10	10	7/8
Notes:				
1. Vertical piping shall be supported in accordance with Table 313.3 and 313.6 of the Uniform Plumbing Code, as amended by Washington State.				

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Pipe Markers

1.2 RELATED SECTIONS

- A. Section 22 05 00 – Common Work Results for Plumbing
- B. Mechanical Piping, Valves, Equipment, and Control Sections

1.3 REFERENCES

- A. ASME A13.1 - Scheme for the Identification of Piping Systems

1.4 SUBMITTALS FOR REVIEW (REFER TO SECTION 22 05 00)

- A. Submit list of wording, symbols, letter size, and color coding for mechanical identification of all systems and equipment.
- B. Product Data: Provide manufacturers catalog literature for each product required.

1.5 REGULATORY REQUIREMENTS

- A. Conform to Uniform Plumbing Code (Section 601) for signage and labeling requirements for potable and non-potable water systems.

PART 2 PRODUCTS

2.1 PIPE MARKERS

- A. Manufacturers: (Refer to Section 22 05 00):
 - 1. W.H. Brady
 - 2. Seton
 - 3. Marking Services, Inc.
- B. Color and Lettering: Conform to ASME A13.1 and Uniform Plumbing Code Section 601. The Uniform Plumbing Code shall take preference over ASME 13.1 in the event of a conflict.
- C. Markers shall identify fluid or gas type, have colored bands with background color in spacing required in Part 3, and the direction of normal flow.
 - 1. Potable water systems shall have green background with white letters.
 - 2. Non-Potable systems shall have yellow background with black uppercase lettering with the words "CAUTION: NONPOTABLE WATER, DO NOT DRINK."
 - 3. Minimum color field length and minimum letter size per the Uniform Plumbing Code.
- D. Plastic Pipe Markers: Factory fabricated; flexible; semi-rigid plastic; preformed to fit around pipe or pipe covering. Larger sizes may have maximum sheet size with spring fastener.

- E. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.

PART 3 EXECUTION

3.1 GENERAL

- A. Install in accordance with manufacturer's recommendations.

3.2 PREPARATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.
- B. Provide identifying devices after completion of coverings and painting.

3.3 PIPE MARKERS

- A. Install underground plastic pipe markers 6 to 8 inches below finished grade, directly above buried pipe. Provide metallic tracer wire imbedded with pipe markers for non-metallic piping systems installed outside of the building footprint.

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Pipe and Equipment Insulation
- B. Inserts and Shields – Installation
- C. Jackets and Fitting Covers

1.2 RELATED SECTIONS

- A. Section 22 05 00 – Common Work Results for Plumbing
- B. Section 22 05 23 – General Duty Valves for Plumbing Piping
- C. Section 22 05 29 – Hangers and Supports for Plumbing Piping and Fittings
- D. Section 22 05 53 – Mechanical Identification
- E. Section 22 10 00 – Plumbing Piping

1.3 REFERENCES

- A. General
 - 1. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials
 - 2. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials
 - 3. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials
 - 4. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials
- B. Glass Fiber
 - 1. ASTM C547 - Standard Specification for Mineral Fiber Preformed Pipe Insulation
- C. Jackets and Fitting Covers
 - 1. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
 - 2. ASTM C921 - Standard Practice for Determining the Properties of Jacketing Materials for Thermal Insulation
 - 3. ASTM D1784 - Standard Specification for Rigid Polyvinyl Chloride (PVC) Compounds Chlorinated Polyvinyl Chloride (CPVC) Compounds

1.4 SUBMITTALS FOR REVIEW (REFER TO SECTION 22 05 00)

- A. For each insulation type, provide material characteristics, minimum and maximum service temperatures, moisture absorption characteristics, thermal and vapor transmission characteristics.
- B. Provide a schedule indicating insulation type and thickness for all pipe sizes of all piping systems.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
- B. Applicator Qualifications: Company specializing in performing the work of this section with minimum three (3) years documented experience and who is authorized by the manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Transport, handle, store, and protect products in accordance with Section 22 05 00.
- B. Accept materials on site, labeled with manufacturer's identification, product density, and thickness.

1.7 ENVIRONMENTAL REQUIREMENTS

- A. Maintain ambient conditions required by manufacturers of each product.
- B. Maintain temperature before, during, and after installation for minimum of twenty-four (24) hours.

1.8 REGULATORY REQUIREMENTS

- A. Conform to flame spread/smoke developed rating of 25/50 in accordance with ASTM E84, NFPA 255, and UL 723. This shall apply to insulation as well as to all accessories including but not limited to adhesives, mastics, jackets, cements, tapes, cloth for fittings, etc.

PART 2 PRODUCTS

2.1 GLASS FIBER INSULATION (PIPING)

- A. Manufacturers (Refer to Section 22 05 00):
 - 1. Johns Manville, Micro-Lok, AP-T Plus
 - 2. Knauf
 - 3. Owens Corning
- B. Insulation: ASTM C547; rigid molded; noncombustible; k factor: ASTM C177, 0.24 Btu·in/(h·ft²·°F) at 75 °F; 850 °F maximum service temperature; 0.2 percent maximum moisture absorption by volume.
- C. Vapor Barrier Jacket: White kraft paper with glass fiber yarn; bonded to aluminized film with pressure sensitive tape lap sealing system; moisture vapor transmission: ASTM E96; 0.02 perm-inches.
- D. Provide with GreenGuard Certification for Children and Schools.

2.2 JACKETS AND FITTING COVERS (PIPING)

- A. PVC Plastic Jacket and Fitting Covers (Interior Applications):
 - 1. Manufacturers (Refer to Section 22 05 00):
 - a. Zeston 2000
 - 2. Jackets and fitting covers: ASTM D1784; one piece molded type fitting covers and sheet material; off-white color; minimum service temperature: 0 °F; maximum service temperature: 450 °F; thickness: 20 mil.

3. Jackets and fitting covers (vapor barrier jackets): ASTM D1784; one piece molded type fitting covers and sheet material; off-white color; minimum service temperature: 0 °F; maximum service temperature: 450 °F; moisture vapor transmission - ASTM E96 - 0.002 perm-inches; thickness: 20 mil.
 4. Connections: Pressure sensitive color matching vinyl tape
- B. Aluminum Jacket (Exterior Applications):
1. Manufacturers (Refer to Section 22 05 00):
 - a. Johns Manville
 - b. Or Approved Equal
 2. Jacket: ASTM C1729; thickness: 0.016 inch sheet; 3105 or 3003 aluminum alloy; factory applied and baked on polyester paint: embossed; joining: Longitudinal slip joints and 2 inch laps. Fittings: 0.016 inch thick die shaped fitting covers with factory attached protective liner.
 3. Metal Jacket Bands: 3/8 inch wide; 0.015 inch thick aluminum.

2.3 INSERTS AND SHIELDS

- A. Inserts: Heavy density insulation which will not crush from weight of pipe. Locate between shield and pipe. Inserts are furnished in this Section 22 07 00 and installed in Section 22 05 29.
- B. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and insulation. Shields are furnished and installed under Section 22 05 29.

PART 3 EXECUTION

3.1 EXAMINATION – GENERAL

- A. Verify that piping has been tested and approved before applying insulation materials.
- B. Verify that surfaces are clean and dry, with foreign material removed.

3.2 INSTALLATION – GENERAL (PIPING)

- A. Continue insulation with vapor barrier through penetrations.
- B. On exposed piping in finished areas, locate insulation and cover seams in least visible locations.
- C. Insulate pipes in accordance with the insulation schedule.
- D. On insulated piping with vapor barrier, insulate fittings, valves, unions, flanges, strainers, flexible connections and expansion joints.
- E. Install materials in accordance with the manufacturer's instructions.
- F. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions.
- G. Insulation on all cold water systems shall be applied with a continuous unbroken vapor seal.
- H. Do not allow hangers, supports, anchors etc., to come in direct contact with the pipe.

- I. Insulate entire system including fittings, unions and flexible connections, flanges and expansion joints
- J. Insulation shall not be applied until system is tested, cleaned and approved.

3.3 GLASS FIBER INSULATION (PIPING)

- A. Cover pipe with glass fiber insulation in thickness scheduled.
- B. When vapor barrier is required, adhere factory applied vapor barrier jacket lap smoothly and securely at longitudinal laps with pressure sensitive strip. Adhere self-sealing butt joint strips over end joints. No staples will be allowed.
- C. Insulate fittings and joints with molded insulation of like material and thickness of adjacent pipe with ends of insulation tucked snugly into throat of fitting and edges adjacent to pipe insulation tufted and tucked in.
- D. Cover insulation with one piece PVC fitting covers.

3.4 JACKETS AND FITTING COVERS (PIPING)

- A. Apply insulation prior to installation of jackets and fitting covers.
- B. Pipe exposed in finished spaces less than 10 feet above finished floor, and where indicated on drawings: finish with PVC jacket and fitting covers.
- C. Secure PVC jackets and fitting covers with stainless steel tacks and wrap seams and tacks with vinyl tape.

3.5 INSERTS AND SHIELDS

- A. Inserts: Heavy density insulation which will not crush from weight of pipe. Locate between shield and pipe. Inserts are furnished in this Section 22 07 00 and installed in Section 22 05 29.
- B. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and insulation. Shields are furnished and installed under Section 22 05 29.

PART 4 SCHEDULES

4.1 SCHEDULES - PIPING

Insulation Schedule - Piping					
System	Operating Temperature (degrees F)	Insulation Type	Pipe Size (inches)	Insulation Thickness (inches)	Notes
Domestic Cold Water and Non-Potable Cold Water (above ground)	—	glass fiber	Under 1 ½"	½	1
			1 ½" and greater	1	

Insulation Schedule - Piping					
System	Operating Temperature (degrees F)	Insulation Type	Pipe Size (inches)	Insulation Thickness (inches)	Notes
Notes: 1. Pipe in tunnels and on the roof shall only have cellular glass insulation in lieu of glass fiber indicated. The insulation thickness shall be increased to have the same equivalent thermal insulating value of the glass fiber piping system indicated in the above table.					

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Natural Gas Piping, Above Grade
- B. Domestic and Non-Potable Water Piping, Above Grade

1.2 RELATED SECTIONS

- A. Section 22 05 00 – Common Work Results for Plumbing
- B. Section 22 05 29 – Hanger and Supports for Plumbing Piping and Fittings
- C. Section 22 05 53 – Identification for Plumbing Piping and Equipment
- D. Section 22 07 00 – Plumbing Insulation

1.3 REFERENCES

- A. General
 - 1. ASME B31.1 - Power Piping
 - 2. ASME B31.9 - Building Service Piping
 - 3. ASME SEC IX - Welding and Brazing Qualifications
 - 4. ASTM F708 - Design and Installation of Rigid Pipe Hangers
 - 5. AWWA C651 - Disinfecting Water Mains
 - 6. MSS SP58 - Pipe Hangers and Supports - Materials, Design and Manufacturer
 - 7. MSS SP69 - Pipe Hangers and Supports - Selection and Application
 - 8. MSS SP89 - Pipe Hangers and Supports - Fabrication and Installation Practices
- B. Copper Piping
 - 1. ASME B16.22 - Wrought Copper and Bronze Solder Joint Pressure Fittings
 - 2. ASTM B32 - Solder Metal; AWS A5.8 - Brazing Filler Metal
 - 3. ASTM B75 (ASTM B75M) - Seamless Copper Tube
 - 4. ASTM B88 (ASTM B88M) - Seamless Copper Water Tube
 - 5. AWS A5.8 - Brazing Filler Metal
- C. Natural Gas Piping
 - 1. ASME B31.2 - Fuel Gas Piping; NFPA 54 - National Fuel Gas Code
 - 2. ASTM D2513 - Thermoplastic Gas Pressure Pipe, Tubing and Fittings
 - 3. NFPA 54 - National Fuel Gas Code

1.4 SUBMITTALS FOR REVIEW

- A. Submit under provisions of Section 22 05 00.
- B. Product Data: Provide data on pipe materials, pipe fittings, and accessories. Provide manufacturers catalog information. Indicate ratings.

1.5 REGULATORY REQUIREMENTS

- A. Coordinate and comply with serving utility company requirements.
- B. Include applicable utility company charges - See Section 22 05 00.
- C. All piping, fittings, valves, fixtures, faucets and equipment containing or conveying potable water shall comply with the latest US Safe Drinking Water Act mandating any wetted surface of the above mentioned items shall not contain above 0.25% lead content by weighted average. All piping, fittings, valve and equipment containing or conveying potable water shall comply with NSF 61 G and NSF 372 or shall be provided with indication on submittals the manufacturer's declaration of self-certification.

1.6 TESTING

- A. Water Piping
 - 1. Upon completion of a section or of the entire hot and cold water supply system, it shall be tested and proved tight under a water pressure not less than the working pressure under which it is to be used or 100 psig whichever is greater. The water used for tests shall be obtained from a potable source of supply. A one hundred (100) pound per square inch air pressure may be substituted for the water test. In either method of test, the piping shall withstand the test without leaking for a period of not less than thirty (30) minutes. Tests shall be made in the presence of the Owner's Representative. Test water piping to connection point at main outside the building.
- B. Natural Gas Piping
 - 1. Gas piping shall be tested and made tight in accordance with the latest edition of the International Fuel Gas Code and any other governing local gas codes.
- C. Records
 - 1. Provide record of pipe tests in accordance with Section 22 05 00.
 - 2. Include certificate of Tests in O&M Manual.
 - 3. Include certificate of Health Department approval of domestic water quality in O&M Manual.

1.7 DELIVERY, STORAGE, AND HANDLING (REFER TO SECTION 22 05 00)

- A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
- B. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- C. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

1.8 WARRANTY

- A. Project Warranty: Refer to Conditions of the Contract for project warranty provisions.

1.9 DRAWING SCHEDULES

- A. Refer to schedules on drawings for model numbers, symbols, etc. for additional information concerning products specified in this section.

PART 2 PRODUCTS

2.1 WATER PIPING, ABOVE GRADE (COPPER)

- A. This includes domestic/potable, non-potable and make-up water.
- B. Copper Tubing: ASTM B88, Type L, hard drawn
 - 1. Fittings: ASME B16.22, wrought copper and bronze
 - 2. Joints: ASTM B32, solder, Grade 95TA

2.2 NATURAL GAS PIPING, ABOVE GRADE

- A. Steel Pipe: ASTM A53 Schedule 40 black, Type E or S, Grade B, seamless, beveled ends.
 - 1. Fittings: ASME B16.3, malleable iron, or ASTM A234/A234M, forged steel welding type
 - 2. Joints: NFPA 54, threaded or welded to ANSI B31.2, ANSI B31.9, ASME Sec 1.

2.3 FLANGES, UNIONS, AND COUPLINGS

- A. Pipe Size 2 inches and under:
 - 1. Ferrous pipe: Class 150 malleable iron threaded unions
 - 2. Copper tube and pipe: Class 150 bronze unions with soldered joints

2.4 DIELECTRIC PIPE FITTINGS:

- A. Dielectric Unions: Factory-fabricated, union assembly for 250 psig minimum working pressure at a 180°F temperature.
 - 1. Manufacturers: Epco Sales, Inc.; Watts Industries, Inc. – Water Products Division or Zurn Industries, Inc. – Wilkins Division.
- B. Dielectric Flanges: Factory-fabricated, companion-flange assembly for 150- or 300-psig minimum pressure to suit system pressures.
 - 1. Manufacturers: Epco Sales, Inc. or Watts Industries, Inc. – Water Product Division.
- C. Dielectric-Flange Insulation Kits: Field-assembled, companion-flange assembly, full-face or ring type. Components include neoprene or Phenolic gasket, Phenolic or polyethylene bolt sleeves, Phenolic washers, and steel backing washers.
 - 1. Provide separate companion flanges and steel bolts and nuts for 150- or 300-psig minimum working pressure to suit system pressures.
 - 2. Manufacturers: Advance Products & Systems, Inc.; Calipco, Inc. or Pipeline Seal and Insulator, Inc.
- D. Dielectric Couplings: Galvanized-Steel coupling, having inert and noncorrosive, thermoplastic lining, with threaded ends and 300-psig minimum working pressure at 225°F temperature.
 - 1. Manufacturers: Calpico, Inc. or Lochinvar Corp.
- E. Dielectric Nipples: Electroplated steel nipple, having inert and non-corrosive thermoplastic lining, with combination of plain, threaded, or grooved end types and 300-psig working pressure at 225°F temperature. Nipples shall be listed by IAPMO/UPC and SBCCI PST and ESI.
 - 1. Manufacturers: Precision Plumbing Products, Inc.; Sioux Chief Manufacturing Co., Inc.; Perfection Corp. or Victaulic Co. of America.
- F. The use of yellow brass is considered acceptable as a dielectric break between dissimilar metals.

PART 3 EXECUTION

3.1 PREPARATION

- A. Ream pipe and tube ends. Remove burrs.
- B. Remove scale and dirt, on inside and outside, before assembly.
- C. Prepare piping connections to equipment with flanges or unions.

3.2 INSTALLATION – GENERAL

- A. Provide pipe in accordance with manufacturer's instructions and as indicated on the drawings.
- B. Install valves in piping system in accordance with 22 05 23 and as indicated on plans.
- C. Provide non-conducting dielectric connections wherever jointing dissimilar metals. Dry Piping Systems (Gas): Install dielectric unions and flanges. Wet Piping Systems (water): Install dielectric coupling and nipple ftg.
- D. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls. Install piping without sags or bonds.
- E. Provide piping and all required offsets and fittings in order to coordinate with other trades, minimize structural interferences, conserve space and maintain headroom. Refer to Section 22 05 00 Common Work Results for Plumbing Piping.
- F. Group piping whenever practical at common elevations.
- G. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- H. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings. Refer to Section 22 07 00.
- I. Prepare exposed, ferrous metals (unfinished pipe, fittings, supports, and accessories) ready for finish painting. Refer to Division 9.
- J. Install valves with stems upright or horizontal, not inverted.
- K. Provide supports, hangers, insulation shields, sleeves, escutcheons, and inserts in accordance with Section 22 05 29.
- L. Connect branch piping to top of mains.
- M. Condensate piping for fuel burning appliances and cooling coils
 1. Provide at all equipment connections.
 2. Slope a minimum of 1% to drain.
 3. Pipe size shall not be less than ¾" and shall not be less than the equipment outlet size.
 4. Provide traps as required by the equipment or appliance manufacturer and/or as detailed on drawings.
 5. Ductless split systems shall be provided with a in-line check valve in the drain line or a trap.

6. Condensate piping shall be configured to permit the cleaning of blockages and perform maintenance without requiring the drainline to be cut.

3.3 INSTALLATION - GAS PIPE

- A. Provide gas stops or plug valves on lines serving furnaces, unit heaters, duct heaters, water heaters and other gas fired equipment adjacent to equipment on outside of cabinet and easily accessible.
- B. Do not use flexible gas pipe connections to furnaces, duct heaters, or hot water heaters.
- C. Install dirt leg with pipe cap, 6 inches long minimum, on each vertical gas pipe drop to equipment.
- D. Gas pressure regulators:
 1. Install in accordance with the manufacturer requirements and drawings.
 2. When installed inside, shall be vented to the outside, through the roof, with full size vent with screened discharge elbowed down. Vent piping shall be sized in accordance with manufacturer's recommendations and code requirements.
 3. Provide a minimum of 10 linear feet of pipe between appliance fuel train inlet and the discharge of the regulator. Provide reducers/increasers to appliance connection at the appliance.
- E. Install gas piping in accordance with International Fuel Gas Code.

3.4 APPLICATION

- A. Flanges / Unions:
 1. Steel Pipe:
 - a. Threaded pipe, 2 inches smaller: Install unions downstream of each valve with screwed joint upstream
 - b. Use unions at final connection to each piece of equipment or apparatus having a threaded pipe connection.
 - c. Use flanges at final connection to each piece of equipment or apparatus having a flanged pipe connection.
 2. Copper Pipe:
 - a. Threaded pipe: Install union down stream of each valve with screwed joint up stream. Use brass male adapters each side of valve.
 - b. Soldered pipe: No unions required either side of valve.
 - c. Use unions at final connection to each piece of equipment or apparatus having a threaded pipe connection.
 - d. Use flanges at final connection to each piece of equipment or apparatus having a flanged pipe connection.
- B. Provide brass male adapters each side of valves in copper piped system. Solder adapters to pipe.

3.5 ERECTION TOLERANCES

- A. Establish invert elevations, slopes for drainage to $\frac{1}{4}$ inch/foot, 2 %, minimum unless indicated otherwise on drawings. Maintain gradients.
- B. Install piping so that entire system is drainable. Provide drain valves with hose connections at low points.

3.6 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

- A. Prior to starting work, verify system is complete, flushed and clean.
- B. Ensure Ph of water to be treated is between 7.4 and 7.6 by adding alkali (caustic soda or soda ash) or acid (hydrochloric).
- C. Inject disinfectant, free chlorine in liquid, powder, tablet or gas form, throughout system to obtain 50 to 80 mg/L residual.
- D. Bleed water from outlets to ensure distribution and test for disinfectant residual at minimum 15 % of outlets.
- E. Maintain disinfectant in system for twenty-four (24) hours.
- F. If final disinfectant residual tests less than 25 mg/L, repeat treatment.
- G. Flush disinfectant from system until residual equal to that of incoming water or 1.0 mg/L.
- H. Take samples no sooner than twenty-four (24) hours after flushing, from 10 % of outlets and from water entry, and analyze in accordance with AWWA C651. Provide laboratory results to Owner's Representative. Obtain approval from local health department.

END OF SECTION

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

PART 1 GENERAL

1.1 CONDITIONS AND REQUIREMENTS

- A. Refer to Divisions 00 & 01 of these specifications, which govern work under Division 23. Refer to other sections of these specifications for additional related requirements.

1.2 SCOPE OF REQUIREMENTS

- A. The work covered by Division 23 of the specifications (HVAC/Mechanical) shall include but not limited to furnishing all materials and supplying all labor, equipment, and services to install the complete mechanical systems as shown on the accompanying drawings and specified herein.
- B. Work done under Division 23 of the specifications shall comply with the requirements specified herein.

1.3 CODES, PERMITS AND FEES

- A. Division 23 work shall be in accordance with the following as adopted by the governing agencies, including amendments:
 - 1. Americans with Disabilities Act (ADA)
 - 2. Applicable State and Local Codes and Ordinances
 - 3. National Electrical Code
 - 4. International Building Code
 - 5. International Fire Code
 - 6. International Mechanical Code
 - 7. Uniform Plumbing Code
 - 8. Washington State Non-Residential Energy Code
 - 9. Washington State Boiler and Unfired Pressure Vessel Code
 - 10. International Fuel Gas Code
- B. Permits and inspections required for the Division 23 work on this project shall be obtained as part of the Division 23 scope of work, and the cost for these permits and inspections shall be included in the Division 23 bid. All inspection certificates shall be delivered to the Owner's Representative prior to final acceptance of the work in accordance with the requirements of these specifications.
- C. All costs levied by utility companies and/or governing agencies shall be included in the Division 23 scope of work and shall be included in the Division 23 bid.
- D. Work shall comply with all regulations associated with all applicable utilities.

1.4 INTENT AND INTERPRETATIONS

- A. It is the intent of these plans and specifications to result in a complete and working Division 23 installation in complete accordance with all applicable codes and ordinances.
- B. The drawings and these specifications are intended to supplement each other. Any details contained in either the drawings or these specifications shall be included as if contained in both.
- C. Items not specifically mentioned in the specifications or noted on the drawings, but which are obviously necessary to make a complete working installation shall be included.

1.5 DEFINITIONS

- A. The term “Acceptance”, when used in Division 23, shall be defined as the Owner’s assumption of ownership for part or all of the Division 23 system. Acceptance of part or all of the Division 23 system, when granted prior to completion of Division 23 work and/or correction of deficiencies, shall not relieve Division 23 of any responsibility for completion of this work and/or correction of these deficiencies.
- B. The term “Date of Acceptance”, when used in Division 23, shall be the official date when Acceptance, as defined in these specifications, occurs. The Date of Acceptance shall be assumed to coincide with granting of Substantial Completion unless noted otherwise by the Owner’s Representative. Deviation of the Date of Acceptance from Substantial Completion can assume to have occurred only when written documentation is provided by the Owner’s Representative specifically indicating this separation and identifying an alternative designation for the Date of Acceptance.
- C. The terms “The Contractor” or “This Contractor”, when used, shall be defined as the Contractor responsible for Division 23 work.
- D. The term “Owner’s Representative”, when used, shall refer to the Architect or their designated representative in accordance with Division 00 and 01.
- E. The term “Provide” shall mean furnish and install.
- F. The term “ HVAC” or “Mechanical”, when used, to distinguish a particular scope of work or portion of the documents, shall mean the Division 23 scope of work and Division 23 documents (drawings and specifications) respectively.

1.6 DRAWINGS

- A. HVAC and Mechanical drawings show general arrangement of piping, ductwork, equipment, etc. Drawings shall be followed as closely as actual building construction and work of other trades will permit.
- B. Architectural and Structural drawings and specifications shall be considered part of this work insofar as they furnish information relating to design and construction of the building. These documents take precedence over Division 23 drawings and specifications if any dimensional discrepancies exist.
- C. Drawings are diagrammatic only. Consequently, all required duct and pipe offsets are not indicated on the drawings. Offsets as required to meet the design intent of the drawings shall be provided.

1.7 GUARANTEE (REFER TO DIVISIONS 00 AND 01)

- A. The Division 23 equipment, materials, and installation shall be guaranteed for a period of one (1) year unless an individual item or specification is otherwise noted as longer. All defects in Division 23 work and/or equipment furnished that develop at any time during the one year guarantee period shall be corrected at no cost to the owner, including any expenses for cutting, patching, and repairing made necessary by corrections of unsatisfactory work and/or damage resulting from incorrect equipment operation.
- B. The guarantee period shall begin upon the Date of Acceptance. When Acceptance is granted for portions of the Division 23 system at different times, the guarantee for each portion of the Division 23 system shall begin upon Acceptance of that portion of the Division 23 system.

- C. Permission to use the permanent Mechanical system for temporary heating during construction does not constitute acceptance. All product and system warranties shall be extended at no cost to the Owner as required to maintain this one (1) year requirement from the Date of Acceptance if such permission is given.
 - 1. Exception: Use of part or all of the Division 23 system prior to the Date of Acceptance, when initiated by the Owner, shall constitute Acceptance of the specific piece of equipment and/or portion of the system only when acknowledgement of Acceptance is noted in written authorization from the Owner as required in these specifications.
- D. Equipment warranties in addition to this guarantee shall be provided in accordance with the table at the end of this section.

1.8 FILTERS

- A. Refer to paragraph "Use of Equipment During Construction" Section 23 05 00.
- B. New filters shall be installed prior to system startup.
- C. If systems are operated prior to testing, adjusting, and balancing (TAB), new filters shall be installed prior to starting (TAB) work.
- D. Filters in portions of Division 23 systems that are completed and used prior to overall project substantial completion shall be changed as required to protect the Division 23 systems.
- E. New filters shall be provided at time of overall project substantial completion. In addition, an extra set shall be furnished as additional stock.

1.9 COST BREAKDOWN

- A. Refer to Divisions 00 and 01 for supplemental requirements.
- B. A breakdown of the HVAC construction cost shall be furnished to the Owner's Representative within 30 days of Notice to Proceed, with separate costs for each of the items listed in the cost breakdown in Part 4 of this section.

1.10 PAYMENT REQUESTS

- A. Refer to Divisions 00 and 01 for supplemental requirements.
- B. Payment requests for materials and equipment will not be reviewed or approved until submittals and operation and maintenance data have been received and approved.
- C. Payment requests for the Energy Management and Control System (EMCS) will not be reviewed or approved until submittals required under Section 23 09 23 have been received. Once these submittals have been received, only payment requests for programming and submittals will be reviewed until all submittals required under Section 23 09 23 have been reviewed and approved. Payment requests for materials and/or installation will not be reviewed prior to approval of all submittals required under Section 23 09 23.

1.11 USE OF EQUIPMENT DURING CONSTRUCTION

- A. Use of the building permanent systems is not allowed during construction with the exception of renovations in partially occupied facilities. When existing systems must remain operational, the heaviest work areas should be dampered and sealed off or otherwise blocked if temporary imbalance of the return air system does not create a greater problem.
- B. The mechanical room and air handling unit equipment shall not be used to store construction or waste materials.
- C. Temporary heating for the facility during the construction phase shall not be supplied by the permanent system installed under Division 23 unless Contractor shall obtain a letter of approval from the Owner stating that they understand equipment expected life may be shortened due to severe usage.
- D. If the Contractor is given permission to use permanent systems for space heating during construction:
 - 1. The Contractor shall be responsible for pressure cleaning all coils and vacuum cleaning all ductwork prior to occupancy if deemed necessary by the Owner's Representative.
 - 2. Product warranties shall be extended as required to account for construction use. Warranty periods offered by equipment manufacturers and/or required by these specifications shall begin at the Date of Acceptance. If equipment manufacturers require that the warranty period begin with use of equipment during construction, the Contractor shall bear the expense of extending all such warranties to maintain the required warranty period beyond the Date of Acceptance.
 - 3. Filters shall be installed meeting the requirements of the drawings and these specifications for the permanent system. Systems which have multiple stages of filtration shall have filters installed meeting the requirements of the drawings and these specifications for the first level of filtration. In addition to the requirements for the permanent system, filters provided during construction shall have a Minimum Efficiency Reporting Value (MERV) rating of 13 whether such a rating is required for the permanent system or not. New filters shall be installed prior to system balancing. Units shall not be operated without filters in place. Check and change filters at intervals sufficient to protect the Division 23 system.
 - 4. Filter fabric shall be provided at all return grilles subject to airborne construction debris. Filter fabric shall be replaced at intervals sufficient to protect the Division 23 system. Filter fabric shall be removed prior to system balancing.

PART 2 PRODUCTS

2.1 EQUIPMENT AND MATERIALS – STANDARDS AND CODES

- 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. Outdated "new" equipment is not acceptable. Each item of equipment and material 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. Motor and equipment name plates as well as applicable UL and AGA labels shall be in place when Project is turned over to the Owner.
- C. Motor efficiencies shall meet or exceed the requirements of the applicable energy code.
- D. 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.

- E. Equipment shall be UL listed as an assembly where listing/labeling program is available for that type of equipment.
- F. 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 electrical codes.
- G. Fuel fired equipment shall be listed by a nationally recognized testing laboratory for use with the particular fuel type.
- H. All pressure vessels and relief valves shall be furnished in accordance with applicable State Boiler and Unfired Pressure Vessel Laws. This shall include rating and stamped in accordance with the ASME Boiler and Pressure Vessel Code where required by Code authorities or State Law.

2.2 EQUIPMENT/MATERIAL SUBSTITUTIONS

- A. 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.
- B. Substitutions will not be permitted without written approval. (Refer to Divisions 00 and 01.)
- C. Where two or more manufacturer designations are listed in these specifications, choice will be optional with the Contractor except that where more than one manufacturer is listed and only one manufacturer's catalog number is specified or only one manufacturer 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).
- D. Substituted equipment with efficiencies less than 95 % of the basis of design efficiency shall not be considered equal to the basis of design.
- E. If the Division 23 Contractor uses manufacturers other than the basis of design, the Contractor shall be responsible for:
 - 1. Insuring the substituted item will fit the available space while allowing proper maintenance access
 - 2. Any changes required by other Contractors caused by the substituted equipment
 - 3. Changes in electrical requirements: See "Equipment Substitutions – Electrical Characteristics" below
 - 4. Changes in structural design due to weight differences
- F. In the event other than specified equipment is used and will not fit job site conditions, this Contractor shall assume responsibility for replacement with items indicated as the basis of design.
- G. Substitutions not approved during bid will not be accepted.

2.3 EQUIPMENT SUBSTITUTIONS – ELECTRICAL CHARACTERISTICS

- A. Products furnished other than the basis of design shall have similar electrical characteristics as the scheduled or specified equipment. The Contractor shall be responsible for any electrical changes caused by products not in accordance with this requirement.

2.4 SUBMITTALS FOR REVIEW

- A. Refer to Divisions 00 and 01 for supplemental requirements.
- B. Shop drawings, catalog information and material schedules shall be submitted for approval on all specified materials and equipment in Division 23 prior to ordering.
- C. Provide specific wiring diagrams for all equipment requiring electrical or control wiring. Upon approval, copies of these diagrams shall be forwarded to pertinent contractors.
- D. Furnish complete shop drawing/catalog data for equipment and materials to be used in the work for review. Allow sufficient time for developing shop drawings, processing and review time so that the installation will not be delayed.
- E. Shop drawings shall be reviewed, approved and stamped by the Contractor prior to submitting to Owner's Representative for approval. Submittals without such approval will be returned without review.
- F. 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.
- G. State sizes, capacities, brand names, motor horsepower, electrical characteristics, accessories, materials, gauges, dimensions, and other pertinent information.
- H. Underline applicable data.
- I. If material or equipment is not as specified or submittal is not complete, it will be rejected. Only complete submittal including all applicable specification sections will be reviewed.
- J. Field applied adhesives, sealants, fillers, primers, glues, and paint shall have VOC's that are equal to or lower than the requirements as identified in part 3 of this section.
- K. Provide cut sheets and a Material Safety Data Sheet (MSDS) for each field applied sealant, adhesive, coating, paint etc used in the building, highlighting VOC limits and chemical component limits. Also indicated in addition to actual VOC emissions identify allowed limits of each product to demonstrate compliance. Submit all proposed field applied products as a single submittal for review with their MSDS data.
- L. Catalog data or shop drawings for equipment which are noted as being reviewed shall not supersede Contract Documents.
- M. Review comments shall not relieve the 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.
- N. Check work described by catalog data with Contract Documents for deviations and errors.
- O. Shop drawings and submittal information shall be provided for all required Division 23 equipment in a single submittal. All Division 23 sections shall have a dedicated submittal and shall include all products with the section. Incomplete submittals will be rejected without review.
 - 1. Exceptions: At the discretion of the Owner's Representative, partial project submittals may be allowed.

- P. Submittal Format:
1. Electronic submittals shall be provided with accordance with all of the following conditions. Electronic submittals which do not comply with all of these conditions will be rejected without review.
 - a. Electronic submittals shall be submitted in the current version of Adobe Portable Document Format (PDF)
 - b. Submittals shall be original PDF's of the document and shall not be created using scanned copies of paper documents.
 - c. PDF documents shall be searchable.
 - d. PDF documents shall be unlocked
 - e. Electronic submittals shall be separated by specification section and identified as such. Submittals which combine multiple sections into a single document will be rejected.
 - f. Electronic submittals shall include a table of contents and each applicable section shall be bookmarked for easy access.
 - g. Electronic submittals shall be clearly marked in RED using boxes and arrows and other appropriate markings to indicate specific product information, option selections, accessories, etc.
- Q. Each product shall be keyed to the paragraph number in the specifications.
- R. Operation and maintenance data for individual equipment shall also be provided subsequent to approval of equipment submittals in a separate binder meeting the same requirements as the submittal binder. Refer to Part 3 of this specification for supplemental requirements.
- S. All submittals and re-submittals as required shall be provided with a cover page incorporating a table similar to that provided at the end of this section. The appropriate box(es) shall be checked on each line item for all submittals.

PART 3 EXECUTION

3.1 LOCATIONS

- A. Coordination of Division 23 equipment and systems to the available space, with other trades and to 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 head room and pitch of sloping lines and avoid structural, electrical, pipe and duct interferences 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. Pipe and duct routing shall be coordinated and verified with all trades prior to fabrication and installation. Additional project costs resulting from failure to do so shall be the Contractor's responsibility.
- D. 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.
- E. Locations of equipment and devices, as shown on the drawings, are approximate unless dimensioned. Verify the physical dimensions of each item of Division 23 equipment to fit the available space and promptly notify the Owner's Representative prior to roughing-in if conflicts appear.

- F. All piping, wiring, equipment, ductwork, tubing, etc., shall be concealed within building construction unless otherwise noted, or in Division 23 rooms.
- G. 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.
- H. 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 10 foot 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 their 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 their proposed excavation. Notify the 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 their failure to exactly locate and preserve underground utilities.

3.2 SCHEDULING

- A. It is understood that while drawings are to be followed as closely as circumstances permit, the Contractor shall be responsible for installation of systems according to the true intent and meaning of 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, secure approval from Owner's Representative for those changes before proceeding with work.
- B. The contractor shall coordinate with the work of various trades when installing interrelated work. Before installation of Division 23 items, proper provisions shall be made to avoid interferences. Changes required in work specified in Division 23 caused by neglect to do so shall be made at no cost to Owner.
- C. Supports and inserts in concrete required for Division 23 supports shall be furnished and installed 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 CUTTING AND PATCHING

- A. All cutting and patching of new and existing construction required for the installation of systems and equipment specified in Division 23, including patching of existing walls, floors, and roofs upon removal of existing Division 23 systems and equipment, shall be the responsibility of the Division 23 Contractor. All cutting shall be accomplished with masonry saws, drills or similar equipment to provide neat uniform openings.
- B. Walls, floors, ceilings and roof shall be patched and repaired 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.
- C. All cutting and patching made necessary to repair defective equipment, defective workmanship or by neglect of this Contractor to properly anticipate their requirements shall be included in Division 23.

- D. 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.
- E. Cutting, patching, repairing, and replacing pavement, sidewalks, roads, and curbs to permit installation of work specified or indicated under Division 23 is responsibility of Division 23.

3.4 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Refer to Divisions 00 and 01 for supplemental 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. The Contractor shall bear expenses arising from correcting deficiencies of work that do 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 (such as controls) in a dry, heated space.
- E. Notify Owner of equipment delivery dates twenty-four (24) hours in advance of delivery.
- F. The Contractor shall be responsible for protection of equipment furnished in Division 23 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.
- G. Ductwork shall be protected and handled in accordance with SMACNA Intermediate Level of duct cleanliness for new construction. Ductwork shall be stored on pallets off of grade in an area that is clean, dry and exposure to dust is minimized. Internally lined ductwork and air handling equipment shall be kept dry. Internal insulation that has been allowed to become wet will be rejected. Air handling equipment that has been allowed to become wet may be rejected.
- 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.

3.5 VISITING THE PROJECT SITE

- A. The premises shall be examined and conditions shall be understood which may affect performance of work of Division 23 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.

3.6 TESTS

- A. See individual specification sections for Testing Requirements.

3.7 COMMISSIONING SUPPORT

- A. The equipment and systems referenced in the Related Work section are to be commissioned per Division 1 and Division 23 commissioning specifications. The contractor has specific responsibilities for scheduling, coordination, startup, testing and documentation. Coordinate all commissioning activities with the Commissioning Authority.
- B. Include allowance in the bid to support commissioning. Allowance shall be a separate line item on the schedule of values.
- C. Include time for commissioning activities on the construction schedule to complete commissioning prior to substantial completion with the exception of seasonal testing which the commissioning agent determines should coincide with peak heating and cooling weather conditions.
- D. Related Work: All Sections in Division 23.

3.8 CHEMICAL WATER TREATMENT SUPPORT

- A. Prior to water treatment being performed for closed loop systems the Division 23 and Section 23 09 23 contractors shall provide documentation that all control valves are connected and in operation and verify that all valves are in the open position for complete circulation of cleaning chemical. Documentation shall be provided at the end of each phase of work prior to commencement of the water treatment work.
- B. See 23 25 00 for additional water treatment requirements.

3.9 PROJECT CLOSEOUT/OPERATION AND MAINTENANCE MANUAL

- A. Electronic submittals shall be provided with accordance with all of the following conditions. Electronic submittals which do not comply with all of these conditions will be rejected without review.
 - 1. Electronic submittals shall be submitted in the current version of Adobe Portable Document Format (PDF)
 - 2. Submittals shall be original PDF's of the document and shall not be created using scanned copies of paper documents.
 - 3. PDF documents shall be searchable.
 - 4. PDF documents shall be unlocked
 - 5. Electronic submittals shall be separated by specification section and identified as such. Submittals which combine multiple sections into a single document will be rejected.
 - 6. Electronic submittals shall include a table of contents and each applicable section shall be bookmarked for easy access.
 - 7. Electronic submittals shall be clearly marked in RED using boxes and arrows and other appropriate markings to indicate specific product information, option selections, accessories, etc.
 - 8. Each product shall be keyed to the paragraph number in the specifications.
- B. Cover page shall include:
 - 1. Job title
 - 2. Date
 - 3. Engineer
 - 4. Architect
 - 5. Contractor
 - 6. Construction Division

- C. Work shall be done in a print shop or bindery.
- D. Provide a master index at the beginning of the manual showing items included. Use plastic tab indexes for the sections and sub-sections of the manual.
- E. Manual shall be organized into the following five sections:
 - 1. Contacts: This shall consist of name, address, and phone number of the following parties: Architect, Mechanical Engineer, Electrical Engineer, General Contractor, HVAC Contractor, Piping Contractor, Sheet Metal Contractor, Temperature Controls Contractor, Sprinkler Contractor, Electrical Contractor and major equipment suppliers.
 - 2. Equipment
 - a. Begin the Equipment section with a separate sub-section containing a list of the Division 23 equipment indicating:
 - 1) Equipment name and designation as it appears on the equipment schedule
 - 2) Area served
 - 3) Manufacturer
 - 4) Model
 - 5) Serial number
 - 6) Name plate data
 - b. The remaining sub-sections shall include, at a minimum, the following for each item of Division 23 equipment. This material shall be organized in a separate tabbed sub-section for each section of the specifications. Within each sub-section, provide separate tabs for each item of equipment, referencing the equipment schedule designation. Provide the following information as applicable:
 - 1) Performance curves or tables showing the specified operating points and the operating points after final testing and balancing
 - 2) Manufacturer's maintenance instructions: Instructions shall include name of vendor, installation instructions, parts numbers and lists, operation instructions of equipment, maintenance and lubrication instructions, troubleshooting guides, and overhaul specifications for major equipment.
 - 3) Step-by-step procedure to follow in putting each piece of Division 23 equipment into operation
 - 4) Wiring diagram for particular equipment item
 - 5) Refer to individual specification sections for additional information required to be incorporated into the Operation and Maintenance Manual.
 - 3. Maintenance Schedule and Spare Parts
 - a. This shall include two sub-sections:
 - 1) The first sub-section shall consist of a preventative maintenance schedule summary table (or list). The table shall be organized by specification section and include:
 - a) Equipment name and designation as it appears on the equipment schedule
 - b) Equipment location
 - c) Type and frequency of preventative maintenance requirements (including lubrication)
 - 2) The second sub-section shall consist of a list of spare parts furnished under this contract. The list shall be organized by specification section and include (similar to that included at the end of this section):
 - a) Equipment name and designation as it appears on the equipment schedule
 - b) Spare part furnished
 - c) Verification by an Owner's Representative that the part(s) have been provided

4. Energy Management and Controls System
 - a. Content shall be as specified in Section 23 09 23.
5. Warranties and Certifications
 - a. Shall include:
 - 1) Test and balance reports
 - 2) Test records of piping, ductwork, etc
 - 3) Signed checklist of instruction period
 - 4) Copies of specific product warranties
 - 5) Copies of certified factory start-up reports
 - 6) Valve tag identification schedules
 - 7) Copy of manual describing specific maintenance services that will be furnished under this contract
 - 8) Seismic Certification
 - 9) Equipment seismic certifications
 - 10) Fire sprinkler certification
- F. Prepare two (2) printed copies in three ring binders of approved manuals for use during the instruction period.
- G. Following instruction period, turn over both printed copies and electronic files to the Owner's Representative and the Owner.
- H. Manuals may be compiled in multiple volumes if necessary for ease of use.

3.10 PROJECT CLOSEOUT/CERTIFIED FACTORY START-UP

- A. Refer to individual sections of these Specifications for specific requirements of certified factory start-up.
- B. Start-up shall be performed by a certified factory representative. Prior to start-up, certification of factory representative shall be forwarded to the Engineer for review.
- C. Start-up shall be scheduled with the owner to allow witnessing of start-up procedures by maintenance personnel. Operation and maintenance training for equipment requiring certified factory start-up shall be conducted at the time of start-up with the certified factory representative present.
- D. Certified factory start-up is required for the following equipment:
 1. Chemical Water Treatment
 2. Condensing Units
 3. Water Chillers
 4. Air Handling Units
 5. Variable Frequency Drives
 6. Airflow monitor stations (23 09 23)

3.11 PROJECT CLOSEOUT/OPERATION AND MAINTENANCE TRAINING

- A. General
 1. Two (2) training sessions shall be scheduled. The first shall occur after final inspection and prior to substantial completion. The second shall occur prior to the end of the first year of operation after acceptance. Training sessions shall be scheduled with the owner a minimum of two (2) weeks in advance.
 2. Instruct the Owner's representative(s) in operation and maintenance of Division 23 systems utilizing Operation and Maintenance Manual.

3. Individuals present shall include the Division 23 contractors, subcontractors and equipment factory representatives as appropriate. Certified factory representatives shall be present for all equipment requiring certified factory start-up.
4. The contractor's representative performing the operation and maintenance training shall locate in the building each piece of equipment included in the O&M manuals, and shall instruct to the satisfaction of the owner's representative required operation and maintenance procedures as outlined in the O&M manuals.
5. Provide a digital video of the training sessions conducted and furnish copies of the video to the Owner. Digital videos shall be of sufficient quality to allow training of future employees or refresher training of personnel. Use DVD format unless directed otherwise by the owner.
6. Training shall occur after final inspection and prior to acceptance by owner. It shall be scheduled with the owner, and shall occur in one consolidated session for all Division 23 equipment.
 - a. Exceptions:
 - 1) Training for equipment requiring certified factory start-up shall be conducted at the time of start-up.
 - 2) Multiple sessions shall be scheduled as required to maintain a maximum allowable duration of any single session of four (4) hours.
 - 3) When separate training sessions are warranted to achieve proper training on all equipment and systems, as determined by the owner's representative, multiple sessions shall be scheduled as required.
 - 4) EMCS system training shall occur independently, and shall be in accordance with the requirements of Section 23 09 23.
 - 5) Training session shall include all equipment included in the table at the end of this section. A table similar to this one shall be used to verify owner training has been completed on all equipment, and shall be included in the Operation and Maintenance Manual.
7. A second training session shall occur prior to the end of the first year of operation after acceptance. Prior to this session, the owner shall submit a list of items to be covered. This session shall include all parts of the first training session necessary to meet the satisfaction of the owner, up to and including full training of all equipment and systems.

3.12 PROJECT CLOSEOUT/SPARE PARTS/MAINTENANCE MATERIALS

- A. A list of spare parts to be provided under this contract has been included at the end of this section. Refer to individual specification sections for specific requirements of spare parts to be furnished under this contract.
- B. Turn spare parts and materials over to Owner.
- C. Provide summarized list of spare parts that have been furnished. List shall include verification by owner's representative that parts have been furnished. Incorporate into O&M Manual. Spare parts list shall be similar to that provided at the end of this section.

3.13 PROJECT CLOSEOUT/96-HOUR RUN TEST

- A. The 96-hour test run shall be made when all field equipment is installed and the system is calibrated and running, and when all other building systems (including drywall, windows, doors, etc.) are complete. This period is intended to demonstrate the operation of the complete building.
- B. The 96-hour run test shall include performance of all associated software and hardware operations called for in these specifications. The test shall be for a duration of 96 continuous hours with no

Contractor maintenance required. The pre-balance conference shall not be scheduled until this test has been completed satisfactorily (i.e. run without errors or alarms for a continuous 96-hour period). Notify owner's representative prior to beginning the 96-hour run test.

3.14 PROJECT CLOSEOUT/PRE-BALANCE REQUIREMENTS (REFER TO SECTION 23 05 93).

- A. Provide Balance Agency with four (4) weeks written notice prior to start of Balance.
- B. Pre-Balance Conference:
 - 1. Prior to commencing Balancing, assemble the following parties at the project site for a pre-balance conference.
 - a. General Contractor
 - b. Plumbing Foreman
 - c. Sheet Metal Foreman
 - d. Control Technician
 - e. Electrician
 - f. Balance Agency
 - g. Owner's Representative
 - 2. Submit a pre-balance checklist similar to the table at the end of this section to the Balancing Agency and the Owner's Representative at the time of the pre-balance conference indicating that the system is ready for balance. The table at the end of this section shall be referenced for the minimum amount of information to be included in this checklist.
 - 3. Should it be determined at the Pre-Balance Conference that the systems are not ready for balance, the balance shall be re-scheduled and the Owner's Representative shall be reimbursed for their travel cost and time at their normal hourly rates.
 - 4. The Contractor shall make adjustments and changes in fan sheaves, belts, dampers and valves as required to achieve correct balance as recommended by the Balancing Agency at no additional cost to the Owner.
- C. The Contractor shall furnish the Balance Agency with a complete set of Contract Documents including drawings, specifications, shop drawings and change orders pertinent to testing and balancing.
- D. The Contractor shall perform the following tasks and provide the following items to the Balance Agency:
 - 1. The Contractor shall put heating, ventilating, and cooling systems and equipment into full operation and continue their operation during each working day of testing and balancing for the Balancing Agency.
 - 2. The Contractor shall make the sheet metal foreman and control contractor available upon request to aid in troubleshooting for the Balancing Agency.
 - 3. The Contractor shall furnish all scaffolding, ladders, and access tools for the Balancing Agency.
 - 4. Make adjustments and changes in fan sheaves, belts and dampers as required to achieve correct balance as recommended by the Balance Agency at no additional cost to the Owner.
 - 5. Arrange access to all dampers, valves, balancing devices and operating equipment during the time that testing and balancing is to be performed.
- E. The Control Contractor shall instruct the Balance Agency in the proper procedure for setting the controls, and provide a lap computer for accessing the control system. Upon completion of Balance, the laptop shall become the property of the Control Contractor.
- F. The Control Contractor shall allow time for a control technician to assist the Balancing Agency.

3.15 PROJECT CLOSEOUT/WARRANTIES

- A. Provide specific equipment/material warranties that extend beyond 1 year project warranty period.
 - 1. Refer to individual specifications sections for required extended warranties.
 - 2. Incorporate extended warranties into O&M Manual in warranties section.

3.16 PROJECT CLOSEOUT/FINAL CLEANING

- A. Clean up all equipment, materials, cartons and other debris that is a direct result of the installation of equipment under this contract.
- B. Clean exposed piping, ductwork and equipment. Repair damaged finishes and leave everything in working order.

3.17 PROJECT CLOSEOUT/RECORD DRAWINGS

- A. Provide in accordance with Division 01 and the requirements of this section.
- B. Record differences between mechanical work as installed and as shown in Contract Documents on a set of prints of mechanical drawings to be furnished by Owner's Representative. Return these prints to Owner's Representative at completion of Project. Notations made on drawings shall be neat and legible. These drawings shall not be used for any other purposes.
 - 1. Coordination drawings and fabrication drawings may not be utilized as record drawings unless
 - a. Content from original drawings set such as notes and keynotes are transferred over to the coordination and fabrication drawings
 - b. Drawings shall not be multidiscipline (ie plumbing and HVAC on same sheet) unless prepared that way in the construction documents
 - c. Drawings clearly identify deviations/modifications to the construction documents
- C. Refer to individual specification sections for additional requirements.

3.18 PROJECT CLOSEOUT/PUNCH LIST PROCEDURES

- A. The Contractor shall notify the Owner's Representative in writing when the project is ready for punch lists. The following items must be complete before punch list will be performed, and must be provided with written verification:
 - 1. Systems are complete and functional, including temperature controls.
 - 2. Testing and balancing is complete, and test and balance reports have been submitted for review.
 - 3. Operation and Maintenance Manuals are complete, and have been submitted for review.
- B. After punch lists are complete, written notice must be forwarded to the Owner's Representative requesting final checkout. Any additional trips beyond the final checkout required due to incomplete items on previous punch lists will be billed to the Contractor at normal rate plus travel expenses.
- C. At the time of initial and final observation, the project foreman shall accompany the observation party and shall remove access panels and perform other duties, as required, to allow complete observation of the entire Division 23 system.

3.19 PROJECT CLOSEOUT/MAINTENANCE SERVICES

- A. Provide a separate manual describing specific maintenance services to be provided under this contract as required under specific specification sections.

PART 4 TABLES

4.1 COST BREAKDOWN

- A. Provide breakdown for the categories that follow. Each category shall identify separate costs for material and labor/installation.
- B. Category:
1. Mobilization
 2. Supervision
 3. Site Utilities
 4. Condensing units
 5. Water Chillers
 6. Chemical water treatment
 7. HVAC Piping equipment: water pumps, air separators, expansion tanks etc.
 8. HVAC Piping
 9. HVAC Piping Insulation
 10. Air Handling Units
 11. Ductwork Fabrication
 12. Ductwork Installation
 13. Duct External Insulation
 14. Air Terminal Units
 15. EMCS Programming and Submittals
 16. EMCS Equipment
 17. Air and Water Balance
 18. Commissioning Assistance

4.2 SPARE PARTS LIST

- A. Section 23 05 19, Gauges
1. Test kit
- B. Section 23 21 23, Pumps
1. One (1) set of mechanical seals for each pump
- C. Section 23 40 00, Air Cleaning Devices
1. One (1) spare set of filters for each filter bank

4.3 PRE-BALANCE CHECKLIST

Pre-Balance Checklist	
Item	Complete
General Contractor	
All doors and closures, windows and ceiling tile shall be installed	
96-hour run test complete	
Piping Contractor:	
All valves, flow meters, temperature/pressure taps installed correctly, functional and accessible	
Strainers and piping, clean, flushed, and free of debris	
Construction strainer baskets replaced with permanent baskets	

Pre-Balance Checklist	
Item	Complete
System filled to proper level and pressure reducing valve set	
Automatic and manual air vents properly installed and functional	
All air purged from system	
Water in expansion tanks at proper level	
All coils piped correctly and accessible	
Correct pump rotation	
Pumps properly aligned, grouted, and anchored	
Vibration isolators properly installed and adjusted	
Service and balance valves are open	
Sheet Metal Contractor	
Ductwork is intact and properly sealed	
Ductwork leak tested and repaired as required	
Access doors installed and properly secured	
Ductwork end caps installed	
Ductwork installed according to drawings and specifications	
Ductwork is free of debris	
All dampers, fire, volume, mixing, splitters are installed, accessible and open	
All terminal boxes, reheat coils, operators and dampers are installed, accessible and operable	
Return air has unobstructed path from each conditioned space back to the unit	
All grilles, registers, diffusers and other devices are installed and functional	
Filters are clean and correctly installed	
Filter frames correctly installed and sealed	
Coils clean, properly installed and sealed	
Drive components installed	
Sheaves properly aligned and tight on their shaft	
Belts adjusted for correct tension	
Belt guard properly installed	
Automatic control dampers installed and functional	
Fan rotation correct	
Fan housing installed and sealed	
All flex connections and vibration isolators are installed correctly	
Fan wheel aligned with adequate clearance	
Fan bearings lubricated	
Controls Contractor	
Controls complete and functional	
Thermostats and sensors calibrated	
Program correct and functional	
Electrical Contractor	
Motors wired and energized	
Proper starter and overload protection installed	
Correct fuses installed	
Motor secured to frame	
Motor bearings lubricated	

Pre-Balance Checklist	
Item	Complete
Fire alarms and duct smoke detectors are fully operational	

General Contractor Sign-Off:	_____	Date:	_____
Piping Contractor Sign-Off:	_____	Date:	_____
Sheet Metal Contractor Sign-Off:	_____	Date:	_____
Controls Contractor Sign-Off:	_____	Date:	_____
Electrical Contractor Sign-Off:	_____	Date:	_____

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Demolition and salvage within existing buildings

1.2 RELATED SECTIONS

- A. Section 23 05 00 – Common Work Results for HVAC

1.3 PERFORMANCE REQUIREMENTS

- A. Contractor shall notify the Owner a minimum of seventy-two (72) hours in advance of any disruption to utility distribution systems.
- B. All connections to and disconnections from existing utilities such as steam, condensate, chilled water, etc. shall be coordinated with and approved by the Owner prior to proceeding with the work. Work shall be planned so as to minimize impact to areas not involved in ongoing construction. Where areas are not involved in ongoing construction are to be impacted, the contractor shall identify such areas, the extent to which they will be affected and the period of time for which they will be affected. Provide required temporary mechanical connections to accommodate the nature of this work.
- C. The contractor is advised that the above notification and scheduling requirement may necessitate rescheduling, partial completion and reconnection, overtime work at night or on weekends or delay of the work. Contractor costs incurred due to the above shall be included in the original bid price and shall not be the cause for additional claims or charges to the Owner.
- D. All new piping shall be installed, cleaned, and tested prior to making connections to existing systems.
- E. Prior to connecting new piping to existing systems, contractor shall test the water quality in the existing hydronic systems. Submit test report to the Owner's Representative and notify the Owner's Representative if these systems do not meet the water quality conditions specified in Section 23 25 00 and request further direction. After connection of new and existing piping systems, it is intended that the entire system meet the conditions specified in Section 23 25 00. Contractor's bid for chemical treatment and charging applies to new piping systems only unless otherwise indicated.
- F. On small additions or sections of piping where it is not practical to isolate from the existing system, the Contractor may test and flush the entire system with system water or fluid. Test at operating pressure and prove tight. Replenish any fluid or chemicals lost due to flushing.

1.4 DEMOLITION AND SALVAGE

- A. Demolition of existing mechanical systems and equipment in remodeled areas shall be provided under Mechanical.
- B. The Owner reserves first right of refusal for all materials and equipment designated for demolition or removal. All items refused by the Owner shall salvage to the Contractor.
- C. Systems and equipment to be removed and salvaged to the Contractor shall be removed from the site.

- D. Equipment and materials salvaged to the Owner shall be delivered to the Owner at on-site location.
- E. Visit the site prior to the bid date to determine the extent of required demolition.
- F. Schedule removal with the general contractor and sequence with other construction activities.
- G. If only portions of existing mechanical systems are indicated to be removed, Contractor shall cap piping and ductwork flush with walls, floors, or ceilings to allow for refinishing (where applicable).

1.5 CUTTING AND PATCHING

- A. Refer to Section 23 05 00.

PART 2 (NOT USED)

PART 3 (NOT USED)

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Common requirements for electric motors furnished on equipment specified in other Sections, including single phase and three phase electric motors.

1.2 RELATED SECTIONS

- A. All mechanical sections with motor driven equipment
- B. Section 23 05 00 – Common Work Results for HVAC
- C. Section 23 09 23 – Direct-Digital Control for HVAC
- D. Section 23 09 95 – Variable Frequency Drives

1.3 REFERENCES

- A. AFBMA 9 - Load Ratings and Fatigue Life for Ball Bearings
- B. NEMA MG 1 - Motors and Generators
- C. NFPA 70 - National Electrical Code

1.4 REGULATORY REQUIREMENTS

- A. Conform to UL Component Recognition for appropriate sizes
- B. Conform to NFPA 70 and applicable State energy code

1.5 DELIVERY, STORAGE, AND HANDLING (REFER TO SECTION 23 05 00)

- A. Protect motors stored on site from weather and moisture by maintaining factory covers and suitable weather-proof covering. For extended outdoor storage, remove motors from equipment and store separately.

PART 2 PRODUCTS

2.1 MANUFACTURERS (REFER TO SECTION 23 05 00):

- A. Century
- B. Baldor
- C. Marathon
- D. General Electric

E. Westinghouse

2.2 GENERAL CONSTRUCTION AND REQUIREMENTS

- A. Motors which are to be controlled from a variable frequency drive shall be designed and constructed for full compatibility with the drive.
- B. Electrical Service:
 - 1. Unless indicated otherwise on equipment schedules, motors shall be supplied as with the following electrical characteristics:
 - a. Motors ½ horsepower and smaller: 115 single phase, 60 Hz
 - b. Motors larger than ½ horsepower shall be three phase and shall be rated as specified and scheduled
- C. Design for continuous operation in 104 °F environment.
- D. Design for temperature rise in accordance with NEMA MG 1 limits for insulation class, service factor, and motor enclosure type.
- E. Visible Nameplate: Indicating manufacturer's name and model number, motor horsepower, RPM, frame size, voltage, phase, cycles, full load amps, insulation system class, service factor, maximum ambient temperature, temperature rise at rated horsepower, minimum efficiency.
- F. Efficiency
 - 1. All motors shall meet or exceed minimum efficiency requirements of the State Energy Code.
 - 2. ECM motors shall have a minimum motor efficiency of 70% when rated in accordance with DOE 10 C.F.R 431.
 - 3. Design A and B squirrel-cage T-frame induction permanently wired three phase motors of 1 HP or more shall be "premium efficient" and shall have a nominal full-load motor efficiency no less than the corresponding values for energy efficient motors provided in NEMA standard MG-1.
Exceptions:
 - a. Motors installed in space conditioning equipment that have certified SEER /EER levels.
This exception is to be utilized for electrically operated unitary air conditioners and condensing units as identified in the State Energy Code.
- G. Inverter Duty Motors (For Use with Variable Frequency Drives):
 - 1. Provide where scheduled on the drawings
 - 2. Motors shall meet NEMA MG-1 Part 31 requirements. Nameplates shall state motors are "inverter duty". Motors shall be suitable for variable torque and have a 10:1 speed ratio.
 - 3. Critical vibration frequencies are not within operating range of controller output.
 - 4. Temperature rise: Class B at rated full load.
 - 5. Insulation: Minimum Class F
 - 6. Provide with shaft grounding rings. Aegis or approved equal.
- H. Wiring Terminations:
 - 1. Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclose terminal lugs in terminal box sized to NFPA 70, threaded for conduit.
 - 2. For fractional horsepower motors where connection is made directly, provide conduit connection in end frame.

2.3 ELECTRICALLY COMMUTATED MOTORS (ECM) SINGLE AND THREE PHASE POWER

- A. ECM motors shall be variable-speed, DC, brushless motors specifically designed for use with single phase, 277 volt (or 120 volt), 60 hertz electrical input. Motor shall be complete with and operated by a single-phase integrated controller/inverter that operates the wound stator and senses rotor position to electronically commute the stator. All motors shall be designed for synchronous rotation. Motor rotor shall be permanent magnet type with near zero rotor losses. Motor shall have built-in soft start and soft speed change ramps.
- B. Motor shall be able to be mounted with shaft in horizontal or vertical orientation. Motor shall be permanently lubricated with ball bearings. Motor shall be direct coupled to the blower. Motor shall maintain a minimum of 70% efficiency over its entire operating range. Provide manual (or optional remote) fan speed output control for field adjustment of the flow setpoint. Inductors shall be provided to minimize harmonic distortion and line noise. Provide isolation between motor assembly and unit casing to eliminate any vibration from the fan/motor to the equipment casing. Provide a motor that is designed to overcome reverse rotation and not affect life expectancy.
- C. The equipment manufacturer shall provide a factory installed PWM controller for either manual or DDC controlled flow adjustment. The manual PWM controller shall be field adjustable with a standard screwdriver. The remote PWM controller shall be capable of receiving a 0-10 Vdc signal from the DDC controller (provided by the controls contractor) to control the flow. When the manual PWM controller is used, the factory shall preset the flow as shown on the schedule.

2.4 THREE PHASE POWER - SQUIRREL-CAGE MOTORS

- A. Starting Torque: Between 1 and 1½ times full load torque
- B. Starting Current: Six times full load current
- C. Power Output, Locked Rotor Torque, Breakdown or Pull Out Torque: NEMA Design B characteristics
- D. Design, Construction, Testing, and Performance: Conform to NEMA MG 1 for Design B motors
- E. Insulation System: NEMA Class F or better
- F. NEMA Service Factor
- G. Motor Frames: NEMA Standard T-Frames of steel, aluminum, or cast iron with end brackets of cast iron or aluminum with steel inserts.
- H. Bearings: Grease lubricated anti-friction ball bearings with housings equipped with plugged provision for relubrication, rated for minimum AFBMA 9, L-10 life of 200,000 hours. Calculate bearing load with NEMA minimum V-belt pulley with belt center line at end of NEMA standard shaft extension. Stamp bearing sizes on nameplate.
- I. Sound Power Levels: To NEMA MG 1
- J. Weatherproof Epoxy (where indicated) Motors: Epoxy coat windings with rotor and starter surfaces protected with epoxy enamel; bearings double shielded with waterproof non-washing grease.

2.5 ENCLOSED MOTOR CONTROLLERS (MOTOR STARTERS)

- A. Enclosed Motor Controllers (starters) and switches are not under Mechanical unless specifically specified with a particular mechanical equipment item.
 - 1. Exception: Variable frequency drives furnished under Section 23 09 23.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install securely on firm foundation. Mount ball bearing motors with shaft in any position.
- B. Check line voltage and phase and ensure agreement with nameplate.
- C. Motor starters and disconnects are not installed or furnished under Mechanical unless specified or scheduled to be factory furnished and mounted with a particular mechanical equipment item. Starters which are furnished with a particular mechanical equipment item but are shipped loose are not installed or wired under Mechanical.
- D. Variable frequency drives are furnished by Section 23 09 23 in accordance with Section 23 09 95, with installation and power wiring by Division 26. Install shaft grounding rings on all VFD controlled motors.
 - 1. Exception: Drives shall be factory furnished, mounted and wired by associated equipment manufacturer when specified.
- E. Application
 - 1. Open drip-proof enclosures (ODP) except where specifically noted otherwise.
 - 2. Totally enclosed fan cooled (TEFC) where exposed to weather or moisture.
 - 3. Unless scheduled otherwise on the drawings, provide the following motor types:
 - a. Fan motors between 1/12 hp and 1 HP shall be provided with ECM motors. Provide with controls for balancing or for remote control operations as indicated in the control drawings. Exceptions:
 - 1) Belt driven fans may use sheave adjustments for airflow balancing if not specified/scheduled to have variable frequency drives.
 - 2) Motors in the airstream of heating terminal units that only operate when providing heat to the space served.
 - 3) Motors installed in space conditioning equipment that have certified SEER /EER levels as specified in the State Energy Code.
 - 4) Motors for smoke control.
 - 5) Motors for clothes dryer booster fans
 - b. Single phase fans and blowers (shaft mounted) that do not fall under the ECM requirements above shall be permanent split capacitor type.
 - c. Single phase fans (non-shaft mounted), pumps, and air compressors that do not fall under ECM requirements above shall be capacitor start type.
 - d. Three phase motors that do not fall under ECM requirements shall be squirrel-cage type
- F. NEMA Open Motor Service Factor Schedule

HP	1800 RPM Motor
1/6 to 1/3	1.35
1/2 to 3/4	1.25

HP	1800 RPM Motor
1 to 150	1.15

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Pressure Gauges (Hydronic Service)
- B. Pressure Gauge Tappings
- C. Stem Type Thermometers and Supports
- D. Test Plugs and Kits

1.2 RELATED SECTIONS

- A. Section 23 05 00 – Common Work Results for HVAC
- B. Section 23 09 23 – Direct-Digital Control for HVAC
- C. Section 23 21 13 – Hydronic Piping

1.3 REFERENCES

- A. Pressure Gauges
 - 1. ASME B40.1 - Gauges - Pressure Indicating Dial Type - Elastic Element

1.4 SUBMITTALS FOR REVIEW (REFER TO SECTION 23 05 00)

- A. General
 - 1. Provide manufacturers data which indicates use, construction, operating range, total range, accuracy, and dimensions.
 - 2. Provide a Gauge Application Table indicating each different use of gauges and the gauge range to be utilized, including minimum and maximum measurement values.

1.5 OPERATION AND MAINTENANCE MATERIALS (REFER TO SECTION 23 05 00)

- A. General: Include instructions for calibrating instruments.

1.6 PROJECT RECORD DOCUMENTS

- A. Record actual locations of components and instrumentation.

1.7 ENVIRONMENTAL REQUIREMENTS

- A. Do not install instruments when areas are under construction, except for required rough-in, taps, supports and test plugs.

1.8 EXTRA MATERIALS

- A. Test kit

PART 2 PRODUCTS

2.1 PRESSURE GAUGES (HYDRONIC SERVICE)

- A. Manufacturers (Refer to Section 23 05 00):
 - 1. Trerice
 - 2. Weiss
 - 3. Weksler
 - 4. Tel Tru
 - 5. Miljoco
- B. Basis of Design: Trerice Series 600CB
- C. Construction: ASME B40.1; 4½ inch dial; cast aluminum case; brass tube and socket; brass movement; painted aluminum dial with black graduations on white background; suitable for outdoor use; psi scale as appropriate for intended use; full scale accuracy of plus or minus 1 %.

2.2 PRESSURE GAUGE TAPPINGS

- A. ¼ inch NPT brass ball valve rated for 250 psig; brass pressure snubber with ¼ inch NPT connections.
- B. For steam systems, provide ¼ inch cast iron syphon, NPT angle or straight pattern.

2.3 STEM TYPE THERMOMETERS AND SUPPORTS

- A. Manufacturers (Refer to Section 23 05 00):
 - 1. Duro
 - 2. Trerice
 - 3. Weiss
 - 4. Weksler
 - 5. Tel Tru
 - 6. Miljoco
- B. Basis of Design: Trerice Series BX9
- C. Construction: Nine (9) inch high, adjustable angle; blue colored organic spirit; lens front tube; UV protected clear acrylic window up to 300 °F and double strength above 300 °F; ¾ inch long NPT brass stem with 2½ inch insertion length; cast aluminum case with enamel or epoxy finish; cast aluminum adjustable joint with positive locking device; scale to suit application; well to suit service; full scale accuracy within 2 %; Fahrenheit scale as appropriate for intended use.
- D. Supports: Brass separable sockets for thermometer stems with or without extensions as required.

2.4 TEST PLUGS AND KITS

- A. Test Plug:
 - 1. Manufacturers (Refer to Section 23 05 00):
 - a. Flow Design
 - b. MG Piping Products
 - c. Pete's Plugs
 - d. Sisco
 - e. Trerice

2. Construction: ¼ inch NPT or ½ inch NPT brass fitting and cap for receiving 1/8 inch outside diameter pressure or temperature probe with neoprene core for temperatures up to 200 °F; nardel core for temperatures up to 350 °F; viton core for temperatures up to 400 °F; brass extension for insulated pipe.
- B. Test Kit:
1. Manufacturers: Same as noted above for Test Plugs.
- C. Test Kit:
1. Manufacturers: Same as noted above for Test Plugs.
 2. Internally padded and fitted carrying case;
 - a. Brass gauge adaptor with probe
 - b. (1) dial face thermometer for 25-125 degree range
 - c. (1) dial face thermometer for 0-220 degree range
 - d. (1) pressure gauge for 0-100 psi

2.5 HYDRONIC FLOW METERS

- A. Water flow and energy meters for use in Hydronic Systems are furnished in Section 23 09 23.

PART 3 EXECUTION

3.1 GENERAL

- A. Install in complete conformance with the manufacturer's instructions.
- B. Coil and conceal excess capillary on remote element instruments.
- C. Provide instruments with scale ranges selected according to service with largest appropriate scale.
- D. Install gauges and thermometers in locations where they are easily read from normal operating level without crawling or climbing. Install vertical to 45 degrees off vertical.
- E. Adjust gauges and thermometers to final angle, clean windows and lenses, and calibrate to zero.

3.2 PRESSURE GAUGES

- A. Provide pressure gauges where indicated on plans.
- B. Install pressure gauges with snubbers. Provide ball valve to isolate each gauge. Install syphon on gauges in steam systems. Extend nipples and syphons to allow clearances from insulation.
- C. Install one pressure gauge per pump, (whether indicated on the drawings or not), with taps and isolation valves. Points of connection shall be before strainers and on suction and discharge of pump; pipe to gauge.

3.3 PRESSURE GAUGE TAPPINGS

- A. Install gauge taps/test plugs in piping; refer to related piping specifications sections.

- B. At minimum, provide gauge taps/test plugs for the purposes of calibration of gauges and thermometers installed in this section and calibration of sensors installed for the Energy Management and Direct Digital Control System in Section 23 09 23.
- C. Where gauges and sensors are located at the same hydraulic and thermal point in the piping system (i.e. a pressure gauge, temperature gauge and Section 23 09 23 located together) a single test plug may be provided.
- D. Provide gauge taps/test plugs as follows:
 - 1. Adjacent to pressure gauges
 - 2. Adjacent to thermometers
 - 3. Adjacent to pressure and temperature sensors provided in Section 23 09 23
 - 4. Inlet and outlet of coil or equipment where pressure and temperature gauges are not furnished.
 - 5. Where indicated on drawings.

3.4 STEM TYPE THERMOMETERS AND SUPPORTS

- A. Provide thermometers where indicated on plans. Install thermometers in piping systems in sockets in short couplings. Enlarge pipes smaller than 2½ inches for installation of thermometer sockets 24 inches on each side of the thermometer. Ensure sockets allow clearance from insulation.

3.5 TEST PLUGS AND KITS

- A. Provide temperature and pressure test plugs where indicated on the plans.
- B. Turn over test kit to the Owner at project closeout.

3.6 METERS

- A. Install in accordance with the manufacturer's written requirements.

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. General Valves

1.2 RELATED SECTIONS

- A. Section 23 05 00 – Common Work Results for HVAC
- B. Section 23 05 53 – Identification for HVAC Piping and Equipment
- C. Section 23 07 00 – HVAC Insulation
- D. Section 23 21 13 – Hydronic Piping

1.3 GENERAL

- A. All materials shall be compatible with ethylene and propylene glycol.

1.4 SUBMITTALS FOR REVIEW (REFER TO SECTION 23 05 00)

- A. Product Data: Include data on valves and accessories. Provide manufacturers catalogue information. Indicate valve data and ratings.

1.5 QUALITY ASSURANCE

- A. Valves: Manufacturer's name and pressure rating marked on valve body.

1.6 PROJECT RECORD DOCUMENTS (REFER TO SECTION 23 05 00)

- A. Record actual locations of valves and piping.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect and handle products to site under provisions of Section 23 05 00.
- B. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
- C. Provide temporary protective coating on iron or steel valves.
- D. Provide temporary end caps and closures. Maintain in place until installation.

PART 2 PRODUCTS

2.1 GENERAL VALVES

- A. Manufacturers (Refer to Section 23 05 00):
 - 1. Bray

2. Crane
 3. Grinnell
 4. Hammond
 5. Jenkins
 6. Milwaukee
 7. Nibco
 8. Powell
 9. Stockham
 10. Walworth
 11. Watts
 12. Apollo
- B. Ball Valves:
1. Up to and including 2 inch: Bronze, two piece body, chrome plated ball with standard port, teflon seat, and stuffing box ring, lever handle, solder or threaded ends with union, 600 psi WG. Provide with memory stops when used as a balancing cock.
 - a. Basis of Design: Milwaukee BA-100S (threaded), Milwaukee BA-150S, (solder)
- C. Butterfly Valves:
1. 2 inch and smaller: Bronze body; threaded or solder ends; Viton seat; stainless steel disk and stem; lever handle operator; memory stops when used as a balancing cock; 175 psi SWP
 - a. Basis of Design: Milwaukee, Butterball BB2-100, threaded. Milwaukee, Butterball BB2-350, solder
 2. 2½ to 5 inch: Cast or ductile iron body; wafer or lug type; extended neck; threaded ends; resilient replaceable EPDM seat rated for -20 to 275 °F; aluminum bronze disc; stainless steel stem; infinite position lever handle operator with memory stop; 200 psi SWP
 - a. Basis of Design: Milwaukee MW223E (wafer). Milwaukee ML223E (lug)

PART 3 EXECUTION

3.1 PREPARATION

- A. Remove scale and dirt on inside and outside before assembly.

3.2 INSTALLATION – GENERAL

- A. Provide valves as indicated on the drawings.
- B. Valves shall be line size unless indicated otherwise.
- C. Valves in mechanical spaces at a height greater than 8 feet shall be provided with gear operators and chain.
- D. Install in accordance with manufacturer's instructions and as indicated on the drawings.
- E. Install valves with stems upright or horizontal, not inverted.
1. Where space allows, install butterfly valves in the horizontal position or rotated 45 degrees to prevent premature failure of the liner and accumulation of debris.

3.3 INSTALLATION – VALVES

- A. Use ball or butterfly valves for shut-off and to isolate equipment, of systems, or vertical risers.
- B. Provide spring loaded (silent) check valves where indicated on drawings and where two or more pumps are installed in parallel.
- C. Use lug end butterfly valves to isolate equipment.
- D. Use $\frac{3}{4}$ inch ball valves with cap for drains at main shut-off valves, low points of piping, bases of vertical risers, and at equipment.

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Pipe Hangers and Supports
- B. Pipe Shields and Saddles
- C. Resilient Clamps
- D. Equipment Supports

1.2 RELATED SECTIONS

- A. Section 23 05 00 – Common Work Results for HVAC
- B. Section 23 05 48 – Vibration Isolation
- C. Section 23 07 00 – HVAC Insulation
- D. Section 23 21 13 – Hydronic Piping
- E. Section 23 31 00 – HVAC Ducts and Casing

1.3 REFERENCES

- A. General
 - 1. ASME B31.9 - Building Services Piping
- B. Pipe Hangers and Supports
 - 1. ASTM F708 - Design and Installation of Rigid Pipe Hangers
 - 2. MSS SP58 - Pipe Hangers and Supports - Materials, Design and Manufacturer
 - 3. MSS SP69 - Pipe Hangers and Supports - Selection and Application
 - 4. MSS SP89 - Pipe Hangers and Supports - Fabrication and Installation Practices

1.4 SUBMITTALS FOR REVIEW (REFER TO SECTION 23 05 00)

- A. Product Data: Provide manufacturers catalog data including load capacity.
- B. Manufacturer's Installation Instructions: Indicate special procedures and assembly of components.

1.5 REGULATORY REQUIREMENTS

- A. Pipe Hangers and Supports
 - 1. Hanger and support systems shall conform to MSS SP58, MSS SP69, MSS SP89

PART 2 PRODUCTS

2.1 PIPE HANGERS AND SUPPORTS

- A. Manufacturers (Refer to Section 23 05 00):
 - 1. Grinnell/Anvil
 - 2. ERICO/Michigan Hanger
 - 3. Crane
 - 4. Fee and Mason
- B. Hydronic Piping
 - 1. Conform to MSS SP58, MSS SP69, and MSS SP89.
 - 2. Hangers for Pipe Sizes ½ to 2 inches: Carbon steel, adjustable swivel, split ring.
 - 3. Hangers for Cold Pipe Sizes 2 inches and over: Carbon steel, adjustable, clevis.
 - 4. Hangers for Hot Pipe Sizes 2½ to 6 inches: Cast iron roll; carbon steel yoke, roll rod and hex nuts.
 - 5. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
 - 6. Multiple or Trapeze Hangers for Hot Pipe Sizes 6 inches and over: Steel channels with welded spacers and hanger rods, cast iron roll.
 - 7. Wall Support for Pipe Sizes to 3 inches: Cast iron hook.
 - 8. Vertical Support: Steel riser clamp.
 - 9. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
 - 10. Floor Support for Hot Pipes Sizes to 4 inches: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
 - 11. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.
- C. Pipe Riser Clamps
 - 1. Steel and Cast Iron Pipe: Extension pipe or riser clamp; carbon steel; black or galvanized finish.
 - a. Basis of design: Grinnell Fig 261.
 - 2. Copper Pipe: Copper tubing riser clamp; carbon steel; copper finish.
 - a. Basis of design: Grinnell Fig CT-121.

2.2 HANGER RODS

- A. Hanger Rods: Mild steel threaded both ends, threaded one end, or continuous threaded.

2.3 PIPE SHIELDS AND SADDLES

- A. Manufacturers (Refer to Section 23 05 00):
 - 1. Anvil
 - 2. Fee & Mason
 - 3. M-Co
 - 4. Pipe Shields, Inc
 - 5. Kin-Line
- B. Hot Piping (insulated pipe, 2 ½" and larger):
 - 1. Protection saddle type; size to suit thickness of insulation; curved carbon steel plate; Anvil Fig 160, 161, 162.
- C. Hot Piping (up to 2"):
 - 1. Insulation protection shield type; carbon steel; galvanized finish; Anvil Fig 167.

2. For vertical pipe hanger supports, the shields shall covering the lower 40% of the circumference of the insulation.
 3. For pipe installed on trapeze hangers, the shields shall extend to cover the full circumference of the pipe.
 4. Shield shall be sized to suite pipe insulation thickness. High density insert furnished in section 23 07 00 and installed in this section.
- D. Cold Piping:
1. Insulation protection shield type; carbon steel; galvanized finish; Anvil Fig 167.
 2. For vertical pipe hanger supports, the shields shall cover the lower 40% of the circumference of the insulation.
 3. For pipe installed on trapeze hangers, the shields shall extend to cover the full circumference of the pipe.
 4. Shield shall be sized to suite pipe insulation thickness. High density insert furnished in Section 23 07 00 and installed in this section.

PART 3 EXECUTION

3.1 GENERAL

- A. Install in accordance with manufacturer's instructions.
- B. Provide neoprene or approved wrap between water piping and metal building components, unistrut or other metal.
 1. Exceptions:
 - a. Not required where piping is isolated from hangers with insulation shields.
 - b. Not required where resilient clamps are used.
- C. Provide templates, anchor bolts, and accessories for mounting and anchoring to other Divisions as applicable.
- D. Construct supports of steel members. Brace and fasten with flanges bolted to structure.
- E. Provide rigid anchors for pipes after vibration isolation components are installed.

3.2 PIPE HANGERS AND SUPPORTS

- A. Support horizontal piping in accordance with applicable codes and the table at the end of this section.
- B. Install hangers to provide minimum ½ inch space between finished covering and adjacent work.
- C. Place hangers within 12 inches of each horizontal elbow.
- D. Use hangers with 1½ inch minimum vertical adjustment.
- E. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
- F. Support riser piping independently of connected horizontal piping.
- G. Provide copper plated hangers and supports for copper piping.

- H. Design hangers for pipe movement without disengagement of supported pipe.
- I. Prime coat exposed steel hangers and supports. (Refer to Division 9) Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.
- J. Support vertical piping at every floor penetration with pipe riser clamps.
- K. Support risers independently of connected horizontal piping.
- L. Provide vibration isolation at supports when required by Section 23 05 48.

3.3 PIPE SHIELDS AND SADDLES

- A. Provide shields and saddles to protect pipe insulation at hangers. (Furnished and installed under Section 23 05 29.)
- B. Size hangers to accommodate pipe insulation and insulation shields where applicable. See Section 23 07 00.

3.4 PIPE INSULATION INSERTS

- A. Furnished under Section 23 07 00, installed under Section 23 05 29.

3.5 EQUIPMENT SUPPORTS

- A. Provide supports and attachments to structure as required for installation of equipment. Supports shall be for basemounted or suspended applications to suit project conditions or as indicated on drawings.
- B. Supports shall comply with Section 23 05 48 and 23 05 49.

PART 4 TABLES

Pipe Size inches	Max. Horizontal Spacing for Hangers feet		Hanger Rod Dia. inches
	Threaded or Welded Joints	Copper Tube and Piping (soldered, brazed or welded joints)	
	Steel (excluding gas)		
1/2	10	6	3/8
3/4	10	6	3/8
1	10	6	3/8
1 1/4	10	6	3/8
1 1/2	12	6	3/8
2 to 3	12	10	1/2
4 to 6	12	10	5/8
8 to 12	12	10	7/8
Notes:			

Pipe Size inches	Max. Horizontal Spacing for Hangers feet		Hanger Rod Dia. inches
	Threaded or Welded Joints	Copper Tube and Piping (soldered, brazed or welded joints)	
	Steel (excluding gas)		
1. Vertical piping shall be supported in accordance with tables 313.3 and 313.6 of the Uniform Plumbing Code as amended by Washington state.			

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Neoprene Waffle Pads
- B. Flexible Duct Connections
- C. Flexible Pipe Connections

1.2 RELATED SECTIONS

- A. Division 03
- B. Section 23 05 00 – Common Work Results for HVAC
- C. Division 23 piping, ductwork and equipment as specified herein.

1.3 REFERENCES

- A. 1999 ASHRAE Handbook, Vibration Isolation

1.4 PERFORMANCE REQUIREMENTS

- A. Provide minimum static deflection of isolators for equipment as indicated.
 - 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

1.5 SUBMITTALS FOR REVIEW (REFER TO SECTION 23 05 00)

- A. Product Information: Provide material and type of construction. Provide schedule of vibration isolator type with location and load on each.
- B. Manufacturer's Installation Instructions: Indicate special procedures and setting dimensions.

PART 2 PRODUCTS

2.1 GENERAL ISOLATORS

- A. Manufacturers (Refer to Section 23 05 00):
 - 1. Amber Booth
 - 2. Kinetics
 - 3. Korfund
 - 4. Mason Industries

5. Isolators provided by the manufacturer of isolated equipment as an accessory to that equipment are acceptable when indicated in these specifications or on the drawings to be provided with isolation equipment as an accessory to the
- B. Neoprene Waffle Pads: Minimum $\frac{3}{4}$ inch thick; maximum loading 40 psi.
 1. Basis of Design: Mason "Super W"

2.2 FLEXIBLE DUCT CONNECTIONS

- A. Manufacturers (Refer to Section 23 05 00):
 1. Ventfabrics
 2. Duro Dyne
- B. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated.
- C. Connector: Fabric crimped into metal edging strip.
 1. Fabric: UL listed fire-retardant neoprene coated woven glass fiber fabric to NFPA 90A, minimum density 26 ounces/yard². Rated for -20 °F to 200 °F for standard, non-corrosive, indoor applications.

2.3 FLEXIBLE PIPE CONNECTORS

- A. Flexible Pipe Connectors - Neoprene
 1. Flexible neoprene connector manufactured of multiple plies of kevlar fabric and neoprene both molded and cured in hydraulic rubber presses.
 2. Connector to have no steel wire, metal braiding, or rings as pressure reinforcement.
 3. Straight connector to have twin-sphere cross-section.
 4. Elbow connector to have single sphere cross-section forming the corner of the joint.
 5. Connector with diameter less than 2½ inches may have threaded ends.
 6. Connector 2½ inches diameter and larger to have floating steel flanges recessed to lock the connector's raised face neoprene flanges.
 7. Connector to be installed on the equipment side of the shut-off valves.
 8. Connector to be rated at a minimum of 150 psi at 220 degrees F.
 9. Straight connector to be installed with twin spheres properly pre-extended as recommended by the manufacturer to prevent additional elongation under pressure.
 10. Acceptable Products:
 - a. Model SFDEJ or SFU by Mason
 - b. Control Assemblies Model ACC by Mason
- B. Flexible Pipe Connectors-Braided hose
 1. Hydronic piping
 - a. Braided flexible stainless steel hose.
 - b. Hose to be rated at a minimum of 250 psi at 250 degrees F.
 - c. Hose to be installed horizontally and parallel to equipment shaft.
 - d. Hose to have a minimum length of 18 inches.
 - e. Hose for 2 inch pipe size and smaller to be equipped with male nipple fittings.
 - f. Hose for 2½ inch pipe size and larger to be equipped with fixed steel flanges.
 - g. Hose to be selected for operating pressure with 4:1 minimum safety factor.
 - h. Acceptable Products:
 - 1) Model BSS by Mason

- 2) Hyspan
- 3) Twin City Hose

PART 3 EXECUTION

3.1 INSTALLATION

- A. Provide and install in accordance with manufacturer's instructions.
- B. Provide isolation for all motor driven equipment furnished in this project:
 - 1. Exceptions:
 - a. In-line circulating pumps
- C. Connect wiring to isolated equipment with flexible hanging loop.
- D. Vibration Isolation Schedules:
 - 1. Flexible duct connectors:
 - a. Provide at connections to all air moving equipment unless noted otherwise on the drawings.
 - b. Ensure metal bands at connectors are parallel with minimum 1" flex between ductwork and the fan while running.
 - 2. Neoprene pad:
 - a. Provide continuous pad between each base mounted rail base and the floor/slab or housekeeping pad for base mounted equipment that is not mounted with external spring isolators.
 - b. Equipment
 - 1) Chillers
 - 3. Flexible piping connections:
 - a. Provide neoprene connectors at all base mounted pumps.
 - b. Provide braided hose connectors at all connections to isolated air moving equipment. Piping connectors made with hose connection kits in Section 23 21 16 is exempt from this requirement.
 - c. Provide braided hose connectors at all pipe connections to chillers
 - d. Drain piping is excluded from the above requirements.

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Nameplates
- B. Pipe Markers
- C. Tags
- D. Tag Chart

1.2 RELATED SECTIONS

- A. Section 23 05 00 – Common Work Results for HVAC
- B. Division 23 Piping, Valves, Equipment, and Control Sections

1.3 REFERENCES

- A. ASME A13.1 - Scheme for the Identification of Piping Systems

1.4 SUBMITTALS FOR REVIEW (REFER TO SECTION 23 05 00)

- A. Submit list of wording, symbols, letter size, and color coding for mechanical identification of all systems and equipment.
- B. Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.
- C. Product Data: Provide manufacturers catalog literature for each product required.

1.5 OPERATION AND MAINTENANCE MATERIALS (REFER TO SECTION 23 05 00)

- A. Include valve tag identification schedule.

PART 2 PRODUCTS

2.1 NAMEPLATES

- A. Description: Laminated three-layer plastic with engraved white letters on black background

2.2 PIPE MARKERS

- A. Manufacturers: (Refer to Section 23 05 00):
 - 1. W.H. Brady
 - 2. Seton
 - 3. Marking Services, Inc.

- B. Color and Lettering: Conform to ASME A13.1
- C. Plastic Pipe Markers: Factory fabricated; flexible; semi-rigid plastic; preformed to fit around pipe or pipe covering. Larger sizes may have maximum sheet size with spring fastener.
- D. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.

2.3 TAGS

- A. Description: Brass or Aluminum with stamped letters; tag size minimum 1½ inch diameter with smooth edges.
 - 1. Provide ¼" letters for piping system abbreviation and ½" sequenced numbers. Provide 1/8" hole for fastener.

2.4 TAG CHART

- A. Description: Typewritten letter size list in aluminum frame, plastic laminated. Chart shall include valve number, service and location.

PART 3 EXECUTION

3.1 GENERAL

- A. Install in accordance with manufacturer's recommendations.

3.2 PREPARATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.
- B. Provide identifying devices after completion of coverings and painting.

3.3 NAMEPLATES/LABELS

- A. Install plastic nameplates with corrosive-resistant mechanical fasteners, or adhesive.
- B. Install labels with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer. For unfinished canvas covering, apply paint primer before applying labels.

3.4 TAGS

- A. Install tags using corrosion resistant chain. Number tags consecutively by location.

3.5 SCHEDULE

- A. Identify all scheduled equipment (pumps, boilers, heat transfer equipment, humidifiers, etc.) and water treatment devices with plastic nameplates. Small devices, such as in-line pumps, may be identified with tags.
- B. Identify control panels and major control components outside panels with plastic nameplates.

- C. Identify valves in main and branch piping with tags. Exception: check valves, valves with factory-fabricated equipment units.
- D. Identify air terminal boxes with numbered tags.
- E. Identify piping, concealed or exposed, with plastic pipe markers or plastic tape pipe markers. Identify service, flow direction, and pressure (when applicable). Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and tee, at each side of penetration of structure or enclosure, and at each obstruction.
- F. Provide ceiling tacks to locate valves, air terminal units and automatic (motorized) dampers above T-bar type ACT panel ceilings. Do not utilize in architectural wood or metal panel ceilings. Locate in corner of panel closest to equipment.
- G. Provide tagged valve schedule (individual to each building) to the owner.

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Testing, adjusting, and balancing of environmental systems including but not limited to air distribution, hydronics, domestic hot water recirculating systems, pure water recirculating systems and other miscellaneous systems, and the equipment and apparatus connected thereto.

1.2 DESCRIPTION

- A. The Contractor shall secure the services of an independent Testing, Adjusting and Balancing (TAB) agency for the TAB of the mechanical systems as specified herein.

1.3 RELATED SECTIONS

- A. Division 1 – Commissioning
- B. Section 23 05 00 – Common Work Results for HVAC
- C. Section 23 09 23 – Direct-Digital Control for HVAC

1.4 REFERENCES

- A. AABC - National Standards for Total System Balance
- B. ADC - Test Code for Grilles, Registers, and Diffusers
- C. ASHRAE 111 - Practices for Measurement, Testing, Adjusting, and Balancing of Building Heating, Ventilation, Air-conditioning, and Refrigeration Systems
- D. NEBB - Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems
- E. SMACNA - HVAC Systems Testing, Adjusting, and Balancing

1.5 SUBMITTALS FOR REVIEW (REFER TO SECTION 23 05 00)

- A. Balancing Agency Information: Include name of balancing agency, documentation of either AABC or NEBB certifications and list of relevant project experience.
- B. Submit signed guarantee of conformance of work with either AABC or NEBB standards as outlined in the Quality Assurance section of these specifications.
- C. Submit proposed data sheets for each different type of equipment and system.

1.6 FIELD REPORTS (REFER TO SECTION 23 05 00)

- A. Submit when deficiencies in systems prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance. Indicate deficiencies in the report.
- B. Submit report prior to preparation of balancing report.

1.7 DATA SHEETS

- A. Indicate data on AABC National Standards for Total System Balance forms or NEBB forms or an exact reproduction thereof.
- B. Data sheets shall, at a minimum, indicate design and actual conditions for all information included in the equipment schedules on the drawings.

1.8 PRELIMINARY AND FINAL BALANCE REPORTS

- A. Submit two (2) draft copies of preliminary balance report for review prior to final acceptance of Project for review.
- B. Make required corrections to the TAB report and provide three (3) final copies of the balance report, one (1) for Architect/Engineer, and two (2) for inclusion in operating and maintenance manuals.
- C. Provide Architect/Engineer's final report in soft cover, letter size, securely bound manuals, complete with index page, indexing tabs, and cover identification. Reports for inclusion in the operating and maintenance manuals shall meet the same requirements, except binding shall be coordinated with the operation and maintenance manuals.

1.9 SUBMITTALS AT PROJECT CLOSEOUT (REFER TO SECTION 23 05 00)

- A. Provide final balance reports for inclusion in the operation and maintenance manuals as described above.

1.10 REGULATORY REQUIREMENTS

- A. Perform total system and equipment balance in accordance with AABC National Standards for Field Measurement and Instrumentation, Total System Balance or NEBB Procedural Standards for Testing, Balancing and Adjusting of Environmental Systems.

1.11 QUALIFICATIONS

- A. Agency: Company specializing in the testing, adjusting, and balancing of systems specified in this section with a minimum of five (5) years, documented experience.
- B. Perform work under the supervision of an AABC Certified Test and Balance Engineer or NEBB Certified Testing, Balancing and Adjusting Supervisor.

1.12 PRE-BALANCING CONFERENCE

- A. Convene at project site one (1) week prior to commencing work of this section, under provisions of Section 23 05 00.

1.13 COORDINATION

- A. See Section 23 05 00 for required interface between the sheetmetal, plumbing, and control contractor, and balance agency.

1.14 ACCEPTABLE TOLERANCES

- A. All systems and equipment shall be adjusted to within plus or minus 10 % of design conditions.

1.15 APPROVED AGENCIES

- A. Approved Agencies (Refer to Section 23 05 00)
 - 1. Testcomm
 - 2. Air Commander
 - 3. Or Approved Equal
- B. Agencies seeking approval for the Testing and Balancing work shall submit for approval during the bid period as specified in Section 23 05 00. The request for substitution shall contain the following information. Requests lacking this information will not be approved.
 - 1. Certification of membership with AABC or NEBB
 - 2. Representative list of projects with at least five projects of similar size and scope to this project.
 - 3. Design Engineer and Owner references - a minimum of two of each

PART 2 (NOT USED)

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that systems are complete and operable before commencing work. Ensure that the items on the pre-balance checklist are completed.
- B. Submit field reports as required to report defects and deficiencies noted during performance of services which prevent system balance.

3.2 PREPARATION

- A. Provide instruments required for testing, adjusting, and balancing operations.

3.3 PROCEDURES

- A. All procedures shall be in accordance with and meet all the requirements of either AABC or NEBB procedural standards. The requirements listed in this section are intended to be supplementary to the requirements of these standards.
- B. Supplemental Requirements
 - 1. Ensure recorded data represents actual measured or observed conditions.
 - 2. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.
 - 3. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.
 - 4. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.

5. At project closeout, Balancing Agency shall be represented at final observation meeting by qualified testing personnel with balancing equipment and two (2) copies of air balancing test report.
 - a. Owner's Representative may choose and direct spot balancing of one zone. Differences of 10 % or more between the spot balance and test report will be justification for requiring repeat of testing and balancing for entire building.
 - b. Re-balancing shall be done in presence of Owner's Representative or Engineer and subject to their approval.
 - c. Spot balance and re-balance shall be performed at no additional cost to Owner. The Contractor shall compensate the Owner's Representative for additional time and expense incurred.

3.4 AIR SYSTEM PROCEDURE

- A. Adjust air handling and distribution systems to provide design supply, return, outside air, and exhaust air quantities at site altitude.
- B. Make air quantity measurements in ducts by Pitot tube traverse of entire cross sectional area of duct. Traverse shall be used for fan total airflow measurement and calibration of airflow measuring stations and terminal units. Branch traverses shall be totaled where a single traverse is not feasible. Any other method of total airflow measurement shall be approved by engineer.
- C. Measure air quantities at air inlets and outlets.
- D. Adjust distribution system to obtain uniform space temperatures free from objectionable drafts and noise.
- E. Use volume control devices to regulate air quantities only to extend that adjustments do not create objectionable air motion or sound levels. Effect volume control by duct internal devices such as dampers.
- F. Vary total system air quantities by adjustment of fan speeds. Calculate drive changes and coordinate with the Sheet Metal contractor for changeout. Vary branch air quantities by damper regulation.
- G. Measure static air pressure conditions on air supply units, including filter and coil pressure drops, and total pressure across the fan. Make allowances for 50 percent loading of filters. In cooperation of Section 23 09 23, set adjustments of automatically operated dampers as specified, indicated or noted.
- H. Adjust outside air dampers, outside air, return air, and exhaust dampers for design conditions.
- I. Measure temperature conditions across outside air, return air, and exhaust dampers to check leakage.
- J. Where modulating dampers are provided, take measurements and balance at extreme conditions. Balance variable volume systems at maximum air flow rate, full cooling, and at minimum air flow rate, full heating.
- K. Measure building static pressure and adjust supply, return, and exhaust air systems to provide required relationship between each to maintain approximately 0.05 inches w.g. positive static pressure near the building entries.
- L. For variable air volume system terminal units set volume controller to minimum and maximum air flow settings indicated. Minimum and maximum stops shall be set and marked. Measurements made in the

maximum air configuration shall be obtained with a sufficient number of boxes in the maximum mode to achieve scheduled maximum total in delivery for the air handler. Measurements made in the minimum air configuration shall be made with all boxes in the minimum mode.

- M. Where air handling equipment supplied to the job provides up to 10% more or less air than design requirements, rooms supplied by that unit will require more precise balance so that the outlets/inlets are within the previously indicated +/-10% of design.
- N. Maintain differentials between supply and return or exhaust quantities so that space pressurization is maintained.
- O. For electric reheat coils on air terminal units, determine if airflow proving is satisfied on minimum airflow. Set damper downstream of terminal unit heating coil to create enough backpressure to make the proving switch.

3.5 HYDRONIC SYSTEM WATER SYSTEM PROCEDURE

- A. Preparation of System - Phase I
 - 1. Open valves fully, including coil stop valves and return line balancing cocks. Close bypass valves.
 - 2. Examine water in system to determine if it has been treated and is clean.
 - 3. Check pump rotation.
 - 4. Check expansion tanks to make sure they are not water logged or air bound and system is full of water.
 - 5. Make certain air is removed from circulating system.
 - 6. Set controls to insure full flow thru coils and equipment. If both heating and cooling is involved, each system shall be balanced in the full flow conditions.
 - 7. Check operating temperature of boilers and other equipment. For systems with glycol, set system fluid temperature so that the average fluid temperature matches design conditions. This may necessitate initial balance at time of substantial completion and final balance in peak heating and cooling season.
 - a. For example, a cooling system with a chiller selected to operate between 45 and 60 degrees shall be balanced at these conditions or an average temperature between supply and return of 52.5 degrees.
 - b. For multimode systems such as heat pumps balance at the average design temperature of the cooling mode.
 - c. Hydronic heat recovery pumps should be balanced in the heating season with the average fluid temperature determined from the winter recovery coil selections.
- B. Performance of Testing and Balancing - Phase II
 - 1. Set circulating pumps to proper g.p.m. delivery.
 - 2. Adjust flow of water through boilers, heat exchangers and other equipment.
 - 3. Check leaving water temperatures, return water temperatures, and pressure drop through equipment. Reset to correct design temperatures.
 - 4. Upon completion of flow readings and coil adjustments, mark settings and record data.
- C. Performance of Testing and Balancing - Phase III
 - 1. After making adjustments to equipment, recheck settings at pumps and equipment. Re-adjust if required.
 - 2. Check water temperature at inlet side of cooling and heating coils. Note rise or drop of temperatures from source.

3. Set controls to minimum position to insure flow through bypass pipes to achieve identical flow rates as that through the coils or equipment.
 4. Follow same procedure for all 3-way and bypass valves.
- D. Pumps which can deliver more than 10% over design flow at the actual system pressure experienced under installed conditions shall have impellers trimmed so that flow is 110% of design flow at full hertz. Test agency shall make recommendations to plumbing contractor regarding pump impeller changes.
- E. Check and record data at each cooling and/or heating element and circulating pump. Where available pump capacity is less than total flow requirements or individual system parts, full flow in one part may be simulated by temporary restriction of flow to other parts. Alternatively, when parallel pumps have been provided, multiple pumps can be operated simultaneously to provide 100% design system flow provided that both pumps can be operated without damage to the system. Where pressure independent balancing valves are used, record valve information (manufacturer, size, and flow), record pressure at device, and verify it is within the range of the valve and that minimum pressures are satisfied. Fluid differential temperature across the coil shall be recorded on the balance form.

3.6 SCHEDULES

- A. Equipment Requiring Testing, Adjusting, and Balancing
1. HVAC Pumps
 2. Heating and Cooling Coils
 3. Air Handling Units
 4. Fans
 5. Air Terminal Units (VAV Boxes)
 6. Coils
 7. Boilers
 8. Chillers
 9. Variable Frequency Drives
- B. Report Forms
1. Title Page:
 - a. Name of Testing, Adjusting, and Balancing Agency
 - b. Address of Testing, Adjusting, and Balancing Agency
 - c. Telephone number of Testing, Adjusting, and Balancing Agency
 - d. Project name
 - e. Project location
 - f. Project Architect
 - g. Project Engineer
 - h. Project Contractor
 - i. Project altitude
 - j. Report date
 2. Summary Comments:
 - a. Design versus final performance
 - b. Notable characteristics of system
 - c. Description of systems operation sequence
 - d. Summary of outdoor and exhaust flows to indicate amount of building pressurization.
 - e. Nomenclature used throughout report
 - f. Test conditions
 3. Instrument List:
 - a. Instrument

- b. Manufacturer
- c. Model number
- d. Serial number
- e. Range
- f. Calibration date
- 4. Electric Motors:
 - a. Manufacturer
 - b. Model/Frame
 - c. HP/BHP
 - d. Phase, voltage, amperage; nameplate, actual, no load
 - e. RPM
 - f. Service factor
 - g. Starter size, rating, heater elements
 - h. Sheave Make/Size/Bore
- 5. Pump Data:
 - a. Identification/number
 - b. Manufacturer
 - c. Size/model
 - d. Impeller
 - e. Service
 - f. Design flow rate, pressure drop, BHP
 - g. Actual flow rate, pressure drop, BHP
 - h. Discharge pressure
 - i. Suction pressure
 - j. Total operating head pressure
 - k. Shut off, discharge and suction pressures
 - l. Shut off, total head pressure
 - m. System supply water temperature (design)
 - n. System Return water temperature (design)
 - o. System supply water temperature (as balanced)
 - p. System Return water temperature (as balanced)
- 6. Boiler Data:
 - a. Boiler manufacturer
 - b. Model number
 - c. Serial number
 - d. Design flow rate/actual flow rate
 - e. Water pressure drop
- 7. Air Cooled Chillers:
 - a. Identification/number
 - b. Manufacturer
 - c. Capacity
 - d. Model number
 - e. Serial number
 - f. Evaporator design flow
 - g. Evaporator actual flow
 - h. Evaporator pressure drop, design and actual
 - i. Evaporator water flow rate, design and actual
- 8. Cooling Coil Data:
 - a. Identification/number
 - b. Location
 - c. Service

- d. Manufacturer
- e. Air flow, design and actual
- f. Water flow, design and actual
- g. Water pressure drop, design and actual (where applicable)
- 9. Heating Coil Data:
 - a. Identification/number
 - b. Location
 - c. Service
 - d. Manufacturer
 - e. Air flow, design and actual
 - f. Water flow, design and actual
 - g. Water pressure drop, design and actual
- 10. Air Moving Equipment
 - a. Location
 - b. Manufacturer
 - c. Model number
 - d. Serial number
 - e. Arrangement/Class/Discharge
 - f. Supply air flow, specified and actual
 - g. Return air flow, specified and actual
 - h. Outside air flow, specified and actual
 - i. Total static pressure (total external), specified and actual
 - j. Inlet pressure
 - k. Discharge pressure
 - l. Sheave Make/Size/Bore
 - m. Number of Belts/Make/Size
 - n. Fan RPM
 - o. On systems with supply and return or exhaust fans record offset volumes used for system pressurization. On variable volume systems, forward offset volumes to the EMCS contractor for input into their programming for return fan tracking.
 - p. On AH and HR systems record heat exchanger and filter air pressure drops.
- 11. Duct Traverse:
 - a. System zone/branch
 - b. Duct size
 - c. Area
 - d. Design velocity
 - e. Design air flow
 - f. Test velocity
 - g. Test air flow
- 12. Air Flow Measuring Station:
 - a. Identification/number
 - b. Location
 - c. Size
 - d. Manufacturer
 - e. Model number
 - f. Serial number
 - g. Design flow rate
 - h. Design pressure drop
 - i. Actual/final pressure drop
 - j. Actual/final flow rate
 - 1) Station calibrated setting

13. Terminal Unit Data:
 - a. Manufacturer
 - b. Type: constant, variable, single, dual duct, fan powered
 - c. Identification/number
 - d. Location
 - e. Model number
 - f. Size
 - g. Minimum static pressure
 - h. Minimum design air flow
 - 1) Minimum unoccupied heating
 - 2) Minimum occupied heating
 - 3) Maximum occupied heating
 - i. Maximum design air flow
 - j. Maximum actual air flow
 - k. Minimum actual air flow
 - 1) Minimum unoccupied heating
 - 2) Minimum occupied heating
 - 3) Maximum occupied heating
 - l. Inlet static pressure
14. Air Distribution Test Sheet:
 - a. Room number/location
 - b. Air inlet/outlet type
 - c. Air inlet/outlet size
 - d. Area factor
 - e. Design velocity
 - f. Design air flow
 - g. Test (final) velocity
 - h. Test (final) air flow
 - i. Percent of design air flow
 - j. For rooms with exhaust, identify:
 - 1) Design offset cfm
 - 2) Actual offset cfm
15. Variable Frequency Drives
 - a. Mfr, size, amp rating, heater/fuse settings
 - b. Control pressure
 - c. Critical zones (top 3 driving the control pressure setpoint)
 - d. VFD speed (hz) and amps at maximum design conditions
 - e. VFD speed (hz) and amps at minimum design conditions

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Pipe and Equipment Insulation
- B. Duct Insulation
- C. Inserts and Shields – Installation
- D. Jackets and Fitting Covers

1.2 RELATED SECTIONS

- A. Section 23 05 00 – Common Work Results for HVAC
- B. Section 23 05 23 – General Duty Valves for HVAC Piping
- C. Section 23 05 29 – Hangers and Supports for HVAC Piping and Fittings
- D. Section 23 05 53 – Identification for HVAC Piping and Equipment
- E. Section 23 21 13 – Hydronic Piping
- F. Section 23 31 00 – HVAC Ducts and Casings

1.3 REFERENCES

- A. General
 - 1. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials
 - 2. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials
 - 3. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials
 - 4. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials
 - 5. ASTM C518 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
 - 6. ASTM C612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation
 - 7. ASTM C665-Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
 - 8. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials
 - 9. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials
 - 10. ASTM E162 - Standard Test Method for Surface Flammability of Materials Using a Radiant Heat Energy Source
 - 11. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi
 - 12. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials
 - 13. SMACNA - HVAC Duct Construction Standards - Metal and Flexible
 - 14. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials
- B. Glass Fiber
 - 1. ASTM C547 - Standard Specification for Mineral Fiber Preformed Pipe Insulation

- C. Jackets and Fitting Covers
 - 1. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
 - 2. ASTM C921 - Standard Practice for Determining the Properties of Jacketing Materials for Thermal Insulation
 - 3. ASTM D1784 - Standard Specification for Rigid PolyVinyl Chloride (PVC) Compounds Chlorinated PolyVinyl Chloride (CPVC) Compounds
- D. Glass fiber, Flexible Blanket (Duct Wrap)
 - 1. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications
- E. Glass Fiber, Flexible (Duct Liner)
 - 1. ASTM C1071 - Standard Specification for Thermal and Acoustical Insulation (Glass Fiber, Duct Lining Material)

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
- B. Applicator Qualifications: Company specializing in performing the work of this section with minimum three (3) years documented experience and who is authorized by the manufacturer.

1.5 SUBMITTALS FOR REVIEW (REFER TO SECTION 23 05 00)

- A. General
 - 1. For each insulation type, provide material characteristics, minimum and maximum service temperatures, moisture absorption characteristics, thermal and vapor transmission characteristics.
 - 2. Provide a schedule indicating insulation type and thickness for each specific pipe, equipment and duct system and installation type.

1.6 REGULATORY REQUIREMENTS

- A. General
 - 1. Conform to flame spread/smoke developed rating of 25/50 in accordance with ASTM E84, NFPA 255, and UL 723. This shall apply to insulation as well as to all accessories including but not limited to adhesives, mastics, jackets, cements, tapes, cloth for fittings, etc.
 - 2. Material packaging shall be clearly UL labeled for the intended purpose.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. In accordance with Section 23 05 00.
- B. Accept materials on site in original factory packaging, labeled with manufacturer's identification, including product density and thickness.
- C. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage.

1.8 ENVIRONMENTAL REQUIREMENTS

- A. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.
- B. Maintain temperature during and after installation for minimum period of twenty-four (24) hours.

PART 2 PRODUCTS

2.1 GLASS FIBER (PIPING)

- A. Manufacturers (Refer to Section 23 05 00):
 - 1. Johns Manville, Micro-Lok, AP-T Plus
 - 2. Knauf
 - 3. Owens Corning
- B. Insulation: ASTM C547; rigid molded; noncombustible; *k* factor: ASTM C177, 0.24 Btu·in/(h·ft²·°F) at 75 °F; 850 °F maximum service temperature; 0.2 percent maximum moisture absorption by volume.
- C. Vapor Barrier Jacket: White kraft paper with glass fiber yarn; bonded to aluminized film with pressure sensitive tape lap sealing system; moisture vapor transmission: ASTM E96; 0.02 perm-inches.
- D. Provide with GreenGuard Certification for Children and Schools.

2.2 JACKETS AND FITTING COVERS (PIPING)

- A. PVC Plastic Jacket and Fitting Covers (Interior Applications):
 - 1. Manufacturers (Refer to Section 23 05 00):
 - a. Zeston 2000
 - b. Speedline Corporation
 - 2. Jackets and fitting covers: ASTM D1784; one-piece molded type fitting covers and sheet material; off-white color; minimum service temperature: 0 °F; maximum service temperature: 450 °F; thickness: 20 mil.
 - 3. Jackets and fitting covers (vapor barrier jackets): ASTM D1784; one-piece molded type fitting covers and sheet material; off-white color; minimum service temperature: 0 °F; maximum service temperature: 450 °F; moisture vapor transmission - ASTM E96 - 0.002 perm-inches; thickness: 20 mil.
 - 4. Connections: Pressure sensitive color matching vinyl tape
- B. Aluminum Jacket (Exterior Applications): ASTM B209
 - 1. Manufacturers (Refer to Section 23 05 00):
 - a. Johns Manville
 - 2. Jacket: ASTM C1729; thickness: 0.016-inch sheet; 3105 or 3003 aluminum alloy; factory applied and baked on polyester paint: embossed; joining: Longitudinal slip joints and 2-inch laps.
 - 3. Fittings: 0.016-inch-thick die shaped fitting covers with factory attached protective liner.
 - 4. Metal Jacket Bands: 3/8 inch wide; 0.015-inch-thick aluminum.

2.3 INSULATION INSERTS FOR PIPE SHIELDS AND SADDLES

- A. Insulation Inserts:
 - 1. At pipe shields:

- a. Extra heavy density insulation which will not crush from weight of pipe.
 - b. Thickness same as scheduled for pipe insulation
 - c. Cover no less than 40% of the circumference of the insulation for pipe supported from hangers. Cover 100% of the circumference of the pipe for pipe supported on trapeze.
 - d. Pittsburg-Corning Foamglas, Calcium Silicate or approved equal.
 - e. Length to match shield length. Coordinate with Section 23 05 29.
2. At Saddles
- a. Pittsburg-Corning Foamglas, Calcium Silicate or approved equal.
 - b. Pre-cut pipe insulation to fit within saddle to maintain insulation integrity of pipe at the saddle location.
 - c. Lengths to match saddle length.
- B. Inserts: Heavy density insulation which will not crush from weight of pipe. Locate between shield and pipe. Inserts are furnished in this Section 23 07 00 and installed in Section 23 05 29.
- C. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and insulation. Shields are furnished and installed under Section 23 05 29.

2.4 GLASS FIBER (EQUIPMENT)

- A. Manufacturers (Refer to Section 23 05 00):
- 1. Johns Manville - Pipe and Tank Insulation
 - 2. Owens Corning
- B. Insulation: Semi-rigid, noncombustible; k factor: ASTM C335 0.27 Btu·in/ (h·ft²·°F) at 75 °F; maximum service temperature: 650 °F; density: 3.0 pounds/foot³.
- C. Vapor Barrier Jacket: White kraft paper with glass fiber yarn, bonded to aluminized film with pressure sensitive tape lap sealing system; moisture vapor transmission: ASTM E96; 0.02 perm-inches.

2.5 REUSABLE VALVE COVERS (HYDRONIC PIPING) (INDOOR ONLY)

- A. Manufacturers (Refer to Section 23 05 00):
- 1. No Sweat Valve Wraps
- B. Product shall be engineered for a wide variety of valves including strainers, automatic balancing devices, circuit setters, ball valves, butterfly valves, control valves and check valves. Product consists of outer jacket, closure assembly and fiberglass insulation.
- C. Outer jacket shall be made of material equal to DuPont Tychem® QC, overlapping and completely covering the insulation with seams joined by tabs made from hook and loop fasteners (Velcro). Butt ends shall have sewn-in-place elastic. Weight of 2.5 oz per square yard, 10 mils thickness, 0.01 Perms water vapor transmission, 65 psi Mullen burst strength, white/glass finish, UV resistant
- D. Outer jacket shall overlap adjoining sections of pipe insulation.
- E. Installation shall not require the use of any special hand tools.
- F. Suitable for continuous operation at 200 degrees Fahrenheit with insulation insert blankets
- G. Fire and smoke performance: Flame spread less than 25, smoke developed less than 50 per ASTM E84.

- H. Insulation Inserts: Fiberglass k-factor 0.26 per inch (ASTM C77). Provide 1 or more layers to meet or exceed minimum insulation thickness requirements as indicated in pipe schedules in Part 4 of this specification.

2.6 GLASS FIBER, FLEXIBLE BLANKET (DUCT WRAP)

- A. Manufacturers (Refer to Section 23 05 00):
1. Johns Manville, R-Series Microlite FSK
 2. Certainteed; Standard Ductwrap
 3. Knauf; Ductwrap
 4. Owens Corning; All Service Ductwrap
- B. Insulation: ASTM C553; flexible, noncombustible blanket; k factor: ASTM C518, 0.27Btu·in/(h·ft²·°F) at 75 °F; maximum service temperature: 250 °F; maximum moisture absorption: 0.20 % by volume; density: 0.75 pounds/foot³; resistance to microbial growth: ASTM C665; shall not support mold, bacteria, or fungus growth.

C. Thermal Properties

Labeled Thickness (inches)	Installed R-Value (hr*ft ² *deg F)/btu	Out of package R-Value (hr*ft ² *deg F)/btu
1	3	3.8
1 ½	4.2	5.2
2	5.6	6.9
2 1/5	6	7.5
3	8.3	10.3
4 2/5	12	12
5 ¾	16	20
7	19	23

- D. Vapor Barrier Jacket: Foil Scrim Kraft (FSK); foil thickness: 0.00035 inches; moisture vapor transmission: ASTM E96; 0.02 perm; Class I vinyl; vinyl thickness: 0.0032 inches; moisture vapor transmission: ASTM E96; 1.3 perm; vapor barrier tape: same material as vapor barrier jacket as recommended by the insulation manufacturer.

2.7 GLASS FIBER, FLEXIBLE (DUCT LINER)

- A. Manufacturers (Refer to Section 23 05 00):
1. Knauf - Duct Liner E-M
 2. Certainteed - Toughgard
 3. Johns Manville - Linacoustic RC (Permacote)
- B. Insulation: ASTM C1071; flexible, noncombustible bonded glass fiber blanket with a black matt faced surface for damage resistance; k factor: ASTM C1071, maximum 0.24 Btu·in/(h·ft²·°F) at 75 °F; maximum service temperature: 250 °F; maximum rated air velocity on coated air side: 6,000 fpm; surface coating with EPA registered anti-microbial agent that will not support growth of fungus or bacteria; anti-microbial agent shall be tested in accordance with: fungi test ASTM C665, fungi test ASTM G21, bacterial test ASTM G22. Insulation coating shall be formaldehyde free.
- C. Unless indicated otherwise on the drawings, liner shall be 1" with a minimum R-value of 4.2 (hr*ft²*deg F)/btu.

- D. Adhesive:
 - 1. Manufacturers (Refer to Section 23 05 00):
 - a. DuroDyne; WBG
 - b. Miracle; PF96
 - c. Scotchgrip Insulation Adhesive; 4230
 - 2. Waterproof, ASTM E162 fire-retardant type
- E. Mechanical Fasteners:
 - 1. Conform to SMACNA Mechanical Fastener Standard MF-1-1975
 - a. Manufacturers (Refer to Section 23 05 00):
 - b. DuroDyne
 - c. Omark dished head "Insul-Pins"
 - d. Grip nails may be used if nail is installed by "Grip Nail Air Hammer" or by "Automatic Fastener Equipment" in accordance with Manufacturer's recommendations.

PART 3 EXECUTION

3.1 EXAMINATION – GENERAL

- A. Verify that piping and ductwork has been tested and approved before applying insulation materials.
- B. Verify that surfaces are clean and dry, with foreign material removed.

3.2 INSTALLATION – GENERAL – (PIPING)

- A. Continue insulation with vapor barrier through penetrations.
- B. On exposed piping in finished areas, locate insulation and cover seams in least visible locations.
- C. Insulate pipes in accordance with the insulation schedule.
- D. On insulated piping with vapor barrier, insulate fittings, valves, unions, flanges, strainers, flexible connections and expansion joints.
- E. On insulated piping without vapor barrier for pipes conveying fluids 180° F or less, do not insulate flanges and unions at equipment, but bevel and seal ends of insulation at such locations.
- F. Install materials in accordance with the manufacturer's instructions.
- G. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions.
- H. Insulation on all cold water systems shall be applied with a continuous unbroken vapor seal. Do not allow hangers, supports, anchors etc., to come in direct contact with the pipe.
- I. Insulate entire system including fittings, unions and flexible connections, flanges and expansion joints. For insulation of valves and other pieces of equipment, see Section 23 07 00. At fire separations, Refer to Division 7 - Fire Stopping.

3.3 GLASS FIBER INSULATION (PIPING)

- A. Cover pipe with glass fiber insulation in thickness scheduled.
- B. When vapor barrier is required, adhere factory applied vapor barrier jacket lap smoothly and securely at longitudinal laps with pressure sensitive strip. Adhere self-sealing butt joint strips over end joints. No staples will be allowed.
- C. Insulate fittings and joints with molded insulation of like material and thickness of adjacent pipe with ends of insulation tucked snugly into throat of fitting and edges adjacent to pipe insulation tufted and tucked in.
- D. Cover insulation with one piece PVC fitting covers.

3.4 JACKETS AND FITTING COVERS (PIPING)

- A. Apply insulation prior to installation of jackets and fitting covers.
- B. Pipe exposed in tunnels and insulated pipe located outdoors and insulated pipe penetrations through exterior walls: finish with aluminum jacket and fitting covers.
- C. Pipe exposed in finished spaces less than 10 feet above finished floor, and where indicated on drawings: finish with PVC jacket and fitting covers.
- D. Secure PVC jackets and fitting covers with stainless steel tacks and wrap seams and tacks with vinyl tape.
- E. Install aluminum jackets located outdoors with seams located on bottom side of horizontal piping. Apply sealing compound and closures to make weathertight.

3.5 INSERTS AND SHIELDS

- A. Insulation inserts are furnished in this section and provided to Section 23 05 29 for installation.
- B. Install finished piping insulation tight to inserts with tightly fitting butt joints. Maintain continuous vapor barrier and jacketing at pipe joints

3.6 INSTALLATION – GENERAL – (EQUIPMENT)

- A. General
 - 1. Provide materials in accordance with the manufacturer's recommendations.
 - 2. Factory Insulated Equipment: Do not insulate.
 - 3. Finish insulation at supports, protrusions, and interruptions.
 - 4. Nameplates and ASME Stamps: Bevel and seal insulation around with a mastic. Do not insulate over.
 - 5. Exposed Equipment in Finished Areas: Locate insulation and cover seams in least visible locations.
 - 6. Cover field insulated tanks with aluminum jackets.

- B. Hydronic Valve Covers: For indoor hydronic valves requiring access for maintenance, repair or cleaning: Insulate with reusable valve covers. Install insulation in single or multiple layers to match scheduled insulation thickness.

3.7 GLASS FIBER (EQUIPMENT)

- A. For equipment not requiring access for maintenance, repair or cleaning.
- B. Cover equipment with glass fiber insulation in thickness scheduled.
- C. Provide vapor barrier jackets. Adhere factory applied vapor barrier jacket lap smoothly and securely at longitudinal laps with pressure sensitive strip. Adhere self-sealing butt joint strips over end joints. No staples will be allowed.

3.8 VALVE COVERS

- A. Install in accordance with manufacturer requirements
- B. Schedule:
- C. Outdoor valves: Provide lace-on blankets.
- D. Indoor hydronic valves: Provide lace-on blankets or reusable valve covers.
- E. Indoor steam valves: Provide lace-on blankets.

3.9 INSTALLATION (DUCTWORK)

- A. General
 - 1. Install in accordance with manufacturer's recommendations and SMACNA HVAC Duct Construction Standards, Metal and Flexible, latest edition.
- B. Glass Fiber, Flexible Blanket (Duct Wrap)
 - 1. Provide glass fiber, flexible insulation (blanket type) as scheduled.
 - 2. Continue insulation through walls, sleeves, hangers, and other duct penetrations.
 - 3. Insulate entire system including fittings, joints, flanges, and expansion joints.
 - 4. Wrap insulation tightly (avoid over compressing) on ductwork with all points butted. Adhere insulation to the ductwork with 4-inch strip of bonding adhesive on 8 inch centers.
 - 5. Overlap all joints and completely seal with vapor barrier tape.
 - 6. Install without sag on underside of ductwork. Use adhesive or mechanical fasteners where necessary to prevent sagging. Lift ductwork off trapeze hangers and insert spacers.
 - 7. Seal vapor barrier penetrations by mechanical fasteners with vapor barrier adhesive.
 - 8. Stop and point insulation around access doors and damper operators to allow operation without disturbing wrapping. Seal and bevel the ends of the insulation.
- C. Glass Fiber, Flexible (Duct Liner)
 - 1. Provide glass fiber duct liner, flexible, as scheduled.
 - 2. Install matt faced surface facing the air stream side. Adhere insulation with fire resistive adhesive for 100 % coverage.
 - 3. Accurately cut liner, point all joints, and thoroughly coat connecting ends with fire resistive adhesive. Butt joints tightly. Top and bottom sections of insulation shall overlap sides. All exposed edges shall be sealed (buttered).

4. If insulation is installed without horizontal, longitudinal, and end joints sealed and buttered together, installation will be rejected and work removed and replaced with work that conforms to this specification.
5. When two or more layers of liner board are required, joints shall be staggered.
6. Secure insulation with mechanical liner fasteners. Refer to SMACNA Standards for spacing.
7. Seal liner surface penetrations with adhesive.
8. Duct dimensions indicated on the plans are gross outside dimensions. Thickness of duct liner has been considered in sizing the ductwork. Do not increase duct size to allow for insulation thickness.

PART 4 SCHEDULES

4.1 SCHEDULES

- A. Insulate heating and cooling equipment including valves, tanks, traps, convertors, radiant ceiling panels, air removal devices, flash tanks, condensate receivers, etc.
- B. Insulate pumps which deliver fluid below ambient temperature.
- C. Equipment, tanks, etc., not factory insulated, shall be insulated under this section.
- D. Expansion tanks and similar equipment not receiving fluid directly from the system do not require insulation.
- E. Valves, traps, pressure reducing valves, pumps, convertors, expansion joints, etc.: Extend insulation 6 inches beyond flanges.
- F. Systems above Ambient Temperature: 2-inch-thick glass fiber insulation with vapor barrier.
- G. Systems below Ambient Temperature: ½ inch thick glass fiber insulation with vapor barrier. Exception: Insulate pump bodies on systems below ambient temperature with 1-inch-thick cellular foam insulation.

Insulation Schedule - Piping					
System	Operating Temperature (degrees F)	Insulation Type	Pipe Size (inches)	Minimum Insulation Thickness (inches)	Notes
Chilled Water	40 to 60	glass fiber k = .21 - .27	Under 1 ½	1	—
			1 ½ and greater	1.5	
Heating Hot Water	105 to 140	glass fiber k = .21 - .28	Under 1 ½	1	—
			1 ½ and greater	1.5	

Insulation Schedule – Ductwork						
Duct Systems	Duct Location and Use	Climate Zone	Minimum Installed Duct Insulation Value	Insulation type	Insulation Thickness	Notes
Supply air	Within the conditioned space	5B	R-3.3	Glass fiber, flexible duct wrap	1.5"	1, 2
Notes 1. When ductwork is indicated to be lined on the drawings, provide 1" duct liner. Lined ductwork inside the conditioned space may have duct wrap reduced by 1.0 inches in thickness. In some instances, duct liner may be indicated on the plans to be greater than 1 inch thick for acoustical purpose and in these instances provide thickness indicated. 2. Where round or oval ductwork is indicated to be lined on the drawings, Provide duct insulation lining and interior protective liner in accordance with Section 23 31 00.						

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Energy Management and Control System (EMCS)
- B. Air Measuring Stations
- C. Water Flow Meters
- D. Control Valves
- E. Controllers
- F. Temperature Control Dampers
- G. Uninterruptible Power Supply (UPS)
- H. General Components

1.2 RELATED SECTIONS

- A. Section 23 05 00 – Common Work Results for HVAC
- B. Section 23 05 05 – Additions or Remodeled Facilities
- C. Section 23 05 23 – General Duty Valves for HVAC Piping
- D. Section 23 05 53 – Identification for HVAC Piping and Equipment
- E. Section 23 05 93 – Testing, Adjusting, and Balancing
- F. Section 23 09 95 – Variable Frequency Drives
- G. Section 23 21 13 – Hydronic Piping
- H. Section 23 21 23 – Hydronic Pumps
- I. Section 23 25 00 – HVAC Water Treatment
- J. Section 23 33 00 – Air Duct Accessories
- K. Section 23 36 00 – Air Terminal Units
- L. Section 23 52 16 – Condensing Boilers
- M. Section 23 64 00 – Packaged Water Chillers (Air Cooled)
- N. Section 23 73 00 – Indoor Central Station Air Handling Units

1.3 REFERENCES

- A. UL 916 - Underwriters Laboratories Standard for Energy Management Equipment
- B. NEC - National Electrical Code
- C. City, county, state, and federal regulations and codes in effect as of date of purchase
- D. For projects with smoke control requirements, the DDC system shall be fully compliant with NFPA guidelines 92A and 92B for smoke control. System hardware shall be UL 864-UUKL listed for smoke control.

1.4 DESCRIPTION

- A. The specification is intended to cover equipment, labor, materials and services sufficient to result in a complete Energy Management and Control System (EMCS) capable of controlling and monitoring the complete mechanical system with owner training as outlined in the drawings and in these specifications.
- B. EMCS contractor shall be responsible for all EMCS and temperature control wiring for a complete and operable system. All wiring shall be done in accordance with all local and national codes and Division 26. This includes all low voltage wiring as well as line voltage wiring required for control power purposes.

1.5 SUBMITTALS FOR REVIEW (REFER TO SECTION 23 05 00)

- A. General
 - 1. Drawings shall be standard sizes: 8½×11 inch, 11×17 inch, 24×36 inch.
- B. Provide temperature controls submittals with the following tabbed sections:
 - 1. Statements of Conformance Section
 - a. Statement of Conformance: The temperature controls submittal shall be accompanied by a statement of conformance by the temperature controls supplier. This statement of compliance shall indicate that the EMCS, as installed, will meet all of the requirements of these specifications. If the EMCS is not capable of meeting each requirement of these specifications, this statement of compliance shall indicate each individual requirement that cannot be met, the impact this might have on the system, and proposed methods of equivalent compliance.
 - b. Statement of Native BACnet Conformance: The temperature controls submittal shall be accompanied by a separate statement of native BACnet conformance by the temperature controls supplier. This statement of compliance shall indicate that the EMCS, as installed, will meet all of the requirements of the specified conformance class of native BACnet architecture. Included with this statement shall be Protocol Implementation Conformance Statements (PICS) for each applicable component necessary to demonstrate compliance.
 - 2. Floor Plan Wiring and Component Section
 - a. Provide floor plans that indicate the location of primary control components such as operator work stations, equipment controllers/main panels, unitary (terminal unit) controllers, and associated controlled equipment (boilers, chillers, air handlers, etc.).
 - b. Provide a network communications (LAN) wiring diagram showing connectivity between control devices.
 - 3. System Interface Section
 - a. Provide graphic systems schematics and flow diagrams.

- b. Provide a complete points list, indicating the plain English description that will be utilized in EMCS programming and the type of point (analog input, analog output, digital input, digital output).
 - c. Provide a complete list of adjustable points, including range of adjustment and initial setting.
 - d. Provide a complete list of alarms, including level of alarm and resulting action.
 - e. Provide a description of the sequences of operation as understood by the controls contractor. This description shall be in the general format of the programming for the controls system, but shall be in narrative form. Copied sequences from the control diagrams are not acceptable.
- 4. System Wiring Diagram Section
 - a. Provide a system schematic layout showing all operators' terminals, equipment controllers, unitary controllers, equipment and systems interface devices, etc. as required for a complete system. The equipment served by each device shall be indicated in the schematic. Individual inputs and outputs shall not be included in this schematic. Each device shown in this schematic shall be cross-referenced to both the individual component schematic as well as the submittal information for that device type. Wiring between devices shall also be cross-referenced to its submittal information.
 - b. Provide individual component schematics for each controller. These schematics shall indicate each device input and output. The available number and type of spare points for each controller as installed as well as the expandability of the device shall be indicated in the schematic.
- 5. EMCS Software Section
 - a. At a minimum, this section shall address each requirement noted in these specifications for the EMCS software.
- 6. Graphical User Interface Section
 - a. Provide a representation of the graphical penetration scheme as outlined in these specifications. This can be in the form of a simple flow diagram.
 - b. Provide a representation of how points and schedules are accessible through the graphical interface.
 - c. Provide a representation of how the system programming is accessible through the graphical user interface.
 - d. Provide information on the graphics development package.
 - e. Provide graphic floor plan displays for all spaces. Include a representation of each of the required space temperature indicators.
 - f. Provide a table of occupied heating, occupied cooling, unoccupied heating and unoccupied cooling setpoints for each temperature control zone. Setpoint criteria shall be obtained from the owner prior to submission of submittals. This table shall be a verification of these criteria.
 - g. Provide a table of the warm-up/pre-cool, occupied and unoccupied scheduling for each temperature control zone. Scheduling criteria shall be obtained from the owner prior to submission of submittals. This representation shall be a verification of these criteria.
- 7. Web Browser Interface Section
 - a. At a minimum, this section shall address each requirement noted in these specifications for the EMCS software.
- 8. Interface Wiring Diagrams Section
 - a. Provide schematics for each point of interface to other systems or packaged equipment controls.
 - b. For interfaces not specified to receive integration devices, provide the following at a minimum:

- 1) Schematics showing the location of all terminal strips and/or connection points between systems (including room designation, location within room, control panel designation, etc. as appropriate).
 - 2) Notation of contractor responsible for hardware (terminal strips, contacts, etc.), wiring and terminations.
 - 3) A description of each point including plain English functional description, electrical characteristics (0 to 10 V, 4 to 20 mA, N/O dry contact, N/C dry contact, etc.).
 - c. For interfaces specified to receive integration devices, provide the following at a minimum:
 - 1) Schematics showing the location of the integration device (including room designation, location within room, control panel designation, etc. as appropriate).
 - 2) Notation of contractor responsible for integration device, wiring and terminations.
 - 3) A description of the information that will be transferable through the integration device, including read/write capabilities.
 - d. Each schematic shall be reviewed, approved and noted as such by both the temperature controls contractor and an authorized agent of the system or equipment requiring interface.
 - e. At a minimum, a wiring diagram shall be provided for each interface noted in the Systems and Equipment Interfaces section of these specifications.
9. Components Section
- a. Provide submittal information for each system hardware component, including the operator's terminal, all controllers, required systems and equipment interface devices, measurement and control devices. Measurement devices shall include units of measurement, range of measurement and accuracies.
 - b. Provide a control damper and damper actuator sizing schedule.
 - c. Provide a control valve sizing schedule.
 - d. Provide a complete recommended spare parts list for the controls system.
- C. Submit a Material Safety Data Sheet (MSDS) for each sealant, adhesive, coating, paint in accordance with Section 23 05 00.

1.6 PROJECT RECORD DOCUMENTS (REFER TO SECTION 23 05 00)

- A. Provide "as-built" documentation of all information required for original system and equipment submittals as outlined above. Information shall be included in the operation and maintenance manuals as outlined below.
- B. In addition to inclusion in the operation and maintenance manuals, the points list, adjustable points list, and alarm points list, as required in the systems control section of the submittals, shall be laminated in plastic after approval by Owner's Representative. One copy shall be posted at the main control cabinet of the building and the second copy shall be given to the Owner.
 1. Points list shall identify BACnet information and address for each point for use in the future by other BACnet manufacturers.

1.7 OPERATION AND MAINTENANCE DATA (REFER TO SECTION 23 05 00)

- A. The Energy Management and Controls System section shall include the following sub-sections:
 1. An individual section for each system. These sections shall include as-built documentation of the information required in the Systems Interface section of the submittals.
 2. Systems Wiring Diagrams Section. This section shall include as-built documentation of the information required in the Systems Wiring Diagrams section of the submittals.

3. Interface Wiring Diagrams Section. This section shall include as-built documentation of the information required in the Interface Wiring Diagrams section of the submittals.
4. Components Section. This section shall include as-built documentation of the information required in the components section of the submittals.

1.8 DELIVERY, STORAGE, AND HANDLING (REFER TO SECTION 23 05 00)

- A. Store products in shipping containers in clean, dry location until installation.
- B. The Contractor shall be responsible for his work and equipment until finally inspected, tested, and accepted. The Contractor shall protect any material that is not immediately installed. The Contractor shall close all open ends of work with temporary covers or plugs during storage and construction to prevent entry of foreign objects.

1.9 QUALIFICATIONS

- A. Manufacturer's/Control Contractor's Qualifications: The EMCS Contractor shall be Control Solutions Northwest.
- B. Installer Qualifications: Building automation and temperature control work shall be done by specialty mechanics in the employ of an EMCS contractor who specializes in this work and are factory trained to install the products of the manufacturer of the automation and control equipment. Installer shall have previous experience installing and programming BACnet system and controllers.
- C. Project Manager/Engineer's Qualifications: The qualifications of the EMCS Contractor's proposed project manager/engineer shall be submitted in writing within the time frame of the submittals. The EMCS Contractor's engineer shall have a minimum of five (5) year's experience in the automation and control field with the same company furnishing the work, as well as having been involved in the design and construction of three (3) projects of similar size and scope. The Owner reserves the right to approve the proposed project engineer from the control contractor's staff. The project manager/engineer shall be designated as a key personnel and shall remain assigned to the project through its entire duration of submittals, construction and warranty. The project manager shall be the contractor's and Owner's primary contact.
- D. The EMCS Contractor shall have local emergency service available on a 24 hour, 7 day-a-week basis, with a normal response time from contact to arrival on site of not more than two (2) hours.

1.10 SYSTEM DEMONSTRATION

- A. The Owner reserves the right, at their option, to require a demonstration by a factory authorized representative of the control system prior to acceptance of any temperature control bid.
- B. This demonstration shall occur at the project site and shall include a functional demonstration and complete description of the control system as bid including, but not limited to, a list of representative projects, software routines, hardware components, sequences of operation, programming and troubleshooting techniques, and availability of service and training.

1.11 SEQUENCING AND SCHEDULING

- A. Complete the 96-hour test run (see Part 3 of this section) prior to test and balance.

- B. Pre-balance inspection and adjustment of the control systems shall be performed by the control engineer in the presence of the Engineer. This operation shall be performed prior to the start of the air and water balance work. Pre-balance inspection and adjustment shall include adjustments of all controls and devices as required to prove sequence of operation in all control modes. A written report, signed by participating parties shall be forwarded to the Owner's Representative with a copy enclosed in the O&M manual.
- C. Prior to water treatment being performed for closed loop systems the Division 23 and Section 230923 contractors shall provide documentation that all control valves are connected and in operation and verify that all valves are in the open position for complete circulation of cleaning chemical. Documentation shall be provided at the end of each phase of work prior to commencement of the water treatment work.
- D. The temperature controls contractor shall assist the balancing agency as required for proper balancing of the systems with assistance as required in Section 23 05 93. Furnish a hand-held controller or laptop service tool for the balance agency use during test and balance. This tool shall be returned to the EMCS Contractor at the end of test and balance.
- E. Final adjustments and calibration of systems and components, including valve and damper operators, shall be accomplished after balancing has been completed and prior to O&M instruction period. This shall include any required setting of controls or labeling of setpoints. The EMCS Contractor shall coordinate scheduling and setpoints with Owner's Representative. A letter of certification, stating the above has been completed and signed by the EMCS Contractor shall be forwarded to the Owner's Representative with a copy enclosed in the O&M manual. The Owner's Representative shall be notified, in writing, two (2) weeks in advance of scheduled time to witness sequence of operation on all systems. All systems shall be fully operational at the time of this demonstration.
- F. See Section 23 05 00 for additional requirements.

1.12 COORDINATION WITH OTHER TRADES

- A. It is the responsibility of the EMCS contractor to communicate all specific needs for proper installation and operation of the EMCS system to all other necessary trades and to verify that those provisions will be made under the terms of this contract without additional cost to the owner.
- B. Coordinate closely with other subcontractors and equipment suppliers to ensure that equipment is provided with features necessary to interface with the EMCS system.
- C. Coordinate and schedule work with all other work in the same area or with work which is dependent upon work by other trades to facilitate mutual progress.
- D. The EMCS Contractor's designated project engineer/manager shall attend the regularly scheduled construction meetings as requested by the General Contractor in response to current construction activities and shall be familiar with the technical aspects of the EMCS design and capabilities.

1.13 NATIVE BACNET SYSTEM REQUIREMENTS

- A. The system shall be modular in nature and shall permit expansion of both capacity and functionality through the addition of sensors, actuators, equipment controllers, unitary controllers, and operator devices while re-using the existing controls equipment.

- B. The EMCS shall utilize native BACnet architecture as referenced by ANSI/ASHRAE Standard 135-most recent edition.
- C. The communication network between controllers shall be BACnet. All controllers shall utilize native BACnet architecture and shall be independently tested and listed through BACnet Testing Laboratories. See <http://www.bacnetassociation.org/btl>.
- D. All points need to be configured so that a “future” BACnet vendor can read/write to all points from a central Owner Work Station for such tasks that would include, but not be limited to, changing setpoints, making adjustments and scheduling of equipment.

1.14 SYSTEMS AND EQUIPMENT INTERFACES

- A. General: Provide interfaces/integration with these microprocessor-based systems and packaged equipment as indicated on the control drawings. Coordinate closely with the respective subcontractors and their equipment suppliers to ensure that the necessary interface is provided with each piece of equipment.

1.15 COMMISSIONING REQUIREMENT

- A. See Section 23 05 00 for commissioning requirements related to this section of work.

1.16 ENERGY CODE COMPLIANCE

- A. The EMCS shall comply with all requirements of the current Washington State Energy Code. The following list is not meant to be all inclusive. Code references are included.
 - 1. Deadband control providing at least 5°F within which the supply of heating and cooling energy to the zone is shut off or reduced to a minimum. C403-2-4-1-2.
 - 2. Thermostatic setback to operate the system to maintain zone temperatures down to 55°F or up to 85°F. C403-2-4-2-1.

PART 2 PRODUCTS

2.1 ENERGY MANAGEMENT AND CONTROL SYSTEM (EMCS)

- A. Native BACnet System Manufacturers (Refer to Section 23 05 00 and this section paragraph 1.9 A).
 - 1. Schneider as installed by Control Solutions Northwest
- B. Manufacturers (Refer to Section 23 05 00):
 - 1. Schneider EcoStruxure as installed by Control Solutions Northwest.
- C. Operator's Terminal
 - 1. Operators terminal is existing in a central campus location. Upgrade hardware and software as required to suit this project and software updates.
 - 2. Minimum Hardware Requirements:
 - a. 2.0 GHz or Quad Core Pentium Processor
 - b. NVIDIA GeForce 200 series graphic card or better
 - c. 16 GIG RAM
 - d. 500 GB SATA fixed hard drive
 - e. 32 inch LCD flat panel display, resolution 1920×1080 or better
 - f. 2 USB2 ports, 2 USB-C ports, 1 ethernet port, 1 HDMI port

- g. Multi-function keyboard
 - h. Two-button optical mouse
 - i. Ink Jet Sheet Fed Printer with 250 sheet minimum capacity
 - j. Alternatively a laptop can be provided at the Owner's request with the same minimum operating characteristics outlined above and approved docking port that matches the characteristics outlined above
 - 3. Minimum System Software Requirements: Windows 11 operating system or more recent version; latest version of Internet Explorer; latest version of Symantec antivirus software.
 - 4. Uninterruptible Power Supply (UPS): Provide a UPS for the computer only.
- D. EMCS Software
- 1. General
 - a. The EMCS contractor shall provide all software required for efficient operation of the EMCS system. Software shall be modular in design to provide maximum flexibility, expansion, and future revision of the system. All functionality described herein shall be regarded as a minimum.
 - b. The Owner shall be furnished with an unlimited site software license so that they may install an unlimited amount of software on their computers to run and operate the building. At the end of the one (1) year warranty, the Owner shall be provided with software upgrade to match the current version offered by the control manufacturer at no additional charge.
 - c. 32-bit software application compatible with the specified operating system; multi-tasking type environment that allows the user to run several applications simultaneously.
 - 2. Control Algorithms: The system shall have the ability to perform the following pre-tested control algorithms: Two-position control, proportional control, proportional plus integral control, proportional, integral, plus derivative control, and automatic tuning of control loops.
 - 3. Operator Access: Different security levels shall be assignable to each operator. Each command and event shall be capable of being assigned a security level. Access to commands, acknowledgment of alarms, etc. shall be limited in accordance with the operator's security level designation.
 - 4. Password Protection: Multiple operator-specific password access protection shall be provided to allow the user/manager to limit workstation control.
 - 5. Event Reporting: The operator shall have the capability to define which actions get reported in which manners, both individually and globally through grouping of events (initially, a minimum of three (3) reporting groups shall be designated: urgent alarms, general alarms, and general messages). Reported events shall include a time and date stamp, site location and network address, and alpha-numeric event ID. Any one or combination of the following event reporting actions shall be assignable to each event: ASCII file, numeric pager (pages personnel by sending numeric messages to personal pagers through the use of a third-party service), printer, and operator's terminal.
 - 6. Trending: Any point, physical or calculated, shall be capable of trending. Collection of data shall be definable by either pre-defined time intervals or pre-defined changes of value. Trending information from anywhere in the system shall be available at the operator's terminal without requiring intervention by an operator.
 - 7. Scheduling: The system shall be capable of scheduling by zone, individual equipment, groups of zones or equipment, building area, and systems. Equipment or zone groups shall be definable by the operator. Weekly schedules shall incorporate seven (7) independent daily programs. System shall also incorporate one-time and annual event scheduling. The system shall automatically update for daylight savings time and leap years. Schedules shall be capable of being overridden at the operator's terminal.

8. Optimum Start/Stop: Start and stop equipment on a sliding schedule based on the individual zone temperature and the heating/cooling capacity of the equipment serving that zone. The heating/cooling capacity value shall be operator adjustable.
 9. Source Temperature Optimization: Automatically perform source temperature optimization for all equipment noted to have temperature setpoints reset by system demand in the control diagrams. Capability shall include resetting of temperature setpoints in accordance with user-adjustable parameters as well as starting and stopping of primary mechanical equipment based on zone occupancy and/or zone load conditions. Temperature optimization loops shall be tuned to minimize cycling and maximize system stability.
 10. Demand Limiting: The system shall be capable of measuring electrical usage from multiple meters serving one building. Each piece of equipment being controlled shall be programmable to respond to peak demand information. The demand control function shall utilize a sliding window method with the operator being able to establish the kilowatt threshold for a minimum of three (3) adjustable demand levels. The operator shall have the capability to set the individual equipment temperature setpoints for each operator defined demand level. Equipment shall not be shed if these reset setpoints are not satisfied. The system shall have failed meter protection, generating an alarm upon loss of KW signal. System shall archive demand and usage information. Information shall be retrievable by day, month-to-date and year-to-date basis.
 11. Night Setback: The system shall allow the space temperature to drift down or up within an adjustable unoccupied temperature range. Heating and/or cooling shall be controlled to maintain the night setback range during the scheduled night setback periods.
 12. Timed Local Override: When provided with occupant override capabilities the system shall permit the override of equipment which has been scheduled off. Override history shall be maintained for each timed local override input point. Local override shall allow system operation for up to 2 hours.
 13. Economizer: The system shall be capable of switchover from mechanical cooling to economizer cooling based on outside air temperature. Economizer operation shall be capable of being overridden by the operator.
 14. Power outage: Programmable controls shall be capable of retaining their programming and time setting during a loss of power for at least 10 hours.
 15. Connectivity: The system shall be capable of monitoring zone level information such as temperature, pressure, valve position etc. and transferring that information to equipment controllers to effect sequence of operations.
- E. Graphical User Interface
1. Floor Plan and System Selection/Penetration: The operator interface shall allow users to access the various system schematics and floor plans via both a graphical penetration scheme and menu selection.
 - a. Graphical penetration scheme: Multiple floor plan displays, when required, shall all be accessible from a single initial screen. System schematics shall be directly accessible from the floor plan display for the area they serve. For zoned systems, both the zone and main system schematics shall be accessible from the floor plan display. For systems that interact with secondary systems and/or equipment (e.g. an air handling unit with a hot water coil served by a heating water system), the secondary system and/or equipment shall be accessible from the primary system schematic. It is the intent of this graphical penetration scheme that, from a single screen, any location served by the system can be accessed and, from any floor plan display, all systems and/or equipment serving that area can be accessed.
 - b. Menu selection: A menu selection shall also be available to the operator, similar in nature and layout to the graphical penetration scheme described above.

2. Floor Plan Displays: Provide color graphic floor plan displays designating each temperature control zone. Each zone shall have a graphic and color-coded indication of space temperature relative to setpoint, with a minimum of five (5) different indicators (e.g. dark blue, light blue, green, yellow, red).
3. System Schematic Displays: Provide color graphic system schematics for all mechanical equipment and systems. Schematics shall be similar in nature to the control diagrams included in the drawings. Each system and/or equipment schematic shall include the following minimum information:
 - a. System designation
 - b. Graphic representation and labeling of all major equipment and components (all scheduled equipment as a minimum)
 - c. Current status of all I/O points applicable to the system (located appropriately for ease of proper association)
4. System Setpoint and Scheduling Adjustments: All system setpoints and schedules shall be adjustable through the graphic interface. This includes all space temperature setpoints, occupied/unoccupied/warm-up schedules, and all points noted in the control diagrams as adjustable. Adjustments shall require only mouse operation and entering of new values. Changes shall be automatically transferred to the appropriate control module.
5. Windowing: The windowing environment of the operator's terminal shall allow the user to simultaneously view several graphics at the same time to analyze total building operation, or to allow the display of a graphic associated with an alarm to be viewed without interrupting work in progress.
6. Programming Accessibility: Programming for sequences of operation shall be accessible through the graphical user interface.
7. Setpoint Accessibility: Each setpoint and/or item indicated in the control diagrams to be adjustable shall be accessible and capable of being modified through the graphical user interface.
8. Graphics Development Package: Graphic generation software shall be provided to allow the user to add, modify, or delete system graphic displays.
 - a. The contractor shall provide libraries of pre-engineered screens and symbols depicting standard HVAC components (e.g. fans, cooling coils, filters, dampers, etc.) and electrical symbols.
 - b. The graphic development package shall use a mouse or similar pointing device in conjunction with a drawing program to allow the user to perform the following:
 - 1) Define symbols
 - 2) Position and size symbols
 - 3) Define background screens
 - 4) Define connecting lines and curves
 - 5) Locate, orient and size descriptive text, define and display colors for all elements
 - 6) Establish correlation between symbols or text and associated system points or other displays
 - c. Graphical displays can be created to represent any logical grouping of system points or calculated data based upon building function, mechanical system, building layout, or any other logical grouping of points which aids the operator in the analysis of the facility. To accomplish this, the user shall be able to build graphic displays that include point data from multiple DDC panels, including application specific controllers used for DDC unitary or VAV terminal unit control.

F. Web Browser Interface

1. Compatibility: The system shall be capable of supporting an unlimited number of clients using Internet Explorer. Web browser software shall be compatible with the operating system and system configuration provided.
2. Consistency with GUI: Graphical screens developed for the GUI shall be the same screens used for the web browser client. Any animated graphical objects supported by the GUI shall be supported by the web browser interface. The browser shall provide the same view of the system as the graphical user interface including graphics, schedules, calendars, logs, etc. and shall provide the same interface methodology as the GUI. Systems that require different views or that require different means of interacting with objects such as schedules or logs will not be permitted.
3. Security: User identification and password security using Java authentication and encryption techniques to prevent unauthorized access shall be implemented. Limitations of user access and control similar to that provided at the operator's terminal shall be assignable to each user.
4. Editing Capabilities: HTML editing by the operator shall be allowed, but not be required for proper operation.
5. Graphics Storage: Graphical screens shall be stored in the server. Systems that require graphics storage on the client machine are not acceptable.
6. Real-Time Data Displays: Values displayed on the web page shall update automatically without requiring a manual refresh of the web page.
7. Links: Graphical screens on the web browser client shall support hypertext links to other locations on the Internet or on Intranet sites through the Uniform Resource Locator (URL).

2.2 DAMPER AND VALVE ACTUATORS

- A. Manufacturers (Refer to Section 23 05 00):
 1. Belimo, for air handling unit dampers and other system control dampers.
 2. As manufactured by approved EMCS manufacturer, for control valves and air terminal unit dampers. Manufacturers who do not have valves and air terminal unit dampers labeled under the Manufacturer's name shall provide Belimo actuators.
- B. High resolution type with positive feedback on valve or damper position, direct coupled type.
 1. Spring-return operation to fail open or closed upon loss of signal or power when indicated on the drawings as normally open (NO) or normally closed (NC), respectively; constructed to maintain last position upon power failure when not specified to be either normally open or normally closed on the drawings.
 2. Built-in overload protection to prevent damage to the actuator when the actuator or damper reaches its end position.
 3. Designed for a minimum life of 60,000 cycles; selected for compatibility with associated equipment.
 4. Damper actuators sized for 50 % safety factor with ample capacity to hold device at an intermediate position.
 5. Valve actuators sized for torque required for valve close-off at maximum pump differential pressure. Valve actuators shall be factory installed on the valves with necessary hold off brackets and shields to protect the actuator from condensation and over-heating.
 6. Actuator unit shall be submerged in oil and sealed in die cast case; UL listed; 3 year unlimited warranty.
- C. Signals
 1. All actuators shall utilize analog actuators.
 2. Exceptions:

- a. Air terminal units (air and valve actuators) and hydronic valve actuators serving terminal units ($\frac{1}{2}$ " and smaller) may utilize floating point actuators.

2.3 AIRFLOW MEASURING STATION – FAN MOUNTED (THERMAL SENSING STYLE)

- A. Manufacturers (Refer to Section 23 05 00):
 1. Ebtron
- B. Sensor shall consist of multiple probes which utilize thermal dispersion technology with a pressure drop not to exceed 0.05 inches WG at 2,000 FPM with 2 % accuracy between 0 to 5,000 FPM.
- C. Probes: Hermetically sealed "bead in glass" thermistor sensors, glass filled polypropylene sensor housing, 304 stainless steel duct mounting brackets, plug and play cable in length to suit application.
- D. Transmitter: 24 VAC, 16 V-A max power which is fused and protected on the transmitter, display CFM (with area input).
- E. Network Configuration: GTX-108e-F transmitter with 9600 baud RS485 serial output in BACnet Protocol, interface includes airflow or velocity.
- F. See schedule on drawings for airflows.
- G. Submittals: Submit installation instructions with product data. After approval by Owner's Representative, forward a copy to the installing contractor (Section 23 33 00).

2.4 AIRFLOW MEASURING STATION – DUCT MOUNTED (THERMAL SENSING STYLE)

- A. Manufacturers (Refer to Section 23 05 00):
 1. Ebtron
- B. Sensor shall consist of multiple probes which utilize thermal dispersion technology with a pressure drop not to exceed 0.05 inches WG at 2,000 FPM with 2 % accuracy between 0 to 5,000 FPM.
- C. Probes: Model GP-1. Gold anodized 6061 aluminum probe, hermetically sealed "bead in glass" thermistor sensors, glass filled polypropylene sensor housing, 304 stainless steel duct mounting brackets, plug and play cable in length to suit application.
- D. Transmitter: 24 VAC, 20 V-A max power which is fused and protected on the transmitter, display CFM (with area input).
- E. Network Configuration: GTX-116-P transmitter with 9600 baud RS485 serial output in BACnet Protocol, interface includes airflow or velocity.
- F. See schedule on drawings for approximate duct sizes and airflows.
- G. Submittals: Submit installation instructions with product data. After approval by Owner's Representative, forward a copy to the installing contractor (Section 23 33 00).

2.5 WATER FLOW METER

- A. Manufacturers (Refer to Section 23 05 00):
 1. Onicon

- B. Insertion type turbine flow meter designed for “hot tap” installation on systems filled with fluid or, alternately, provide with an insertion meter installation kit complete with thread-o-let nipple and full port valve for installation on systems with no fluid in the system.
 - 1. F1200 Series Dual Turbine Flow Meters for pipe sizes 2 ½” and larger for irregular flow conditions caused by inadequate straight pipe runs.
- C. Pipe size and flow rate as indicated on the drawings.
- D. Materials-Chilled Water, Hot Water (to 280 degrees F)
 - 1. 316SS for heating water over 250 degrees F.
 - 2. 316 SS for non-metallic Pipe
- E. Performance and Options
 - 1. Wetted parts shall be bright tin plated brass or Type 316 stainless steel.
 - 2. Sensing method shall be impedance sensing, nonmagnetic and non-photoelectric.
 - 3. Accuracy ± 2 % of actual reading from 0.4 to 20 FPS.
 - 4. 400 psi (maximum operating pressure).
 - 5. 200 degrees F (maximum continuous liquid temperature).
 - 6. Non-isolated analog output signals, 0 to 10 VDC and 20 mA, linear with flow. Binary (digital) dry contact output for bi-directional flow meter.
 - 7. 24 VDC power supply.
 - 8. Hot tap installation to include branch outlet tapping, close nipple, full port ball valve and hot tap adapter.
 - 9. Local display shall be LCD with BACnet interface. Display to suit application:
 - a. BTU applications: System 10 (LCD display that displays energy, flow and temperature data)
 - b. Flow applications: Series D-1200 or BD-1200 (bi directional flow)
 - 10. Provide with temperature sensors for monitor of energy in addition to flow when indicated on control drawings.

2.6 CONTROL VALVES

- A. Manufacturers (Refer to Section 23 05 00):
 - 1. As manufactured by approved EMCS manufacturer, or approved by the Owner’s Representative.
- B. 2-way or 3-way as indicated on the drawings
- C. Ball or butterfly valves of suitable construction for intended application in accordance with the manufacturers recommendations
- D. Throttling plugs and renewable composition seats
- E. Stainless steel ball and stems
- F. Suitable for close-off pressure differential equal to the total head of the respective circulating pump or system steam pressure
- G. Provided with manual positioning capability to allow manual positioning of valve in absence of control power
- H. Sized by the control contractor for a 4 psi maximum pressure drop

- I. Ball valves (up to 2"):
 - 1. Belimo B2/3 series characterized control valves.
 - 2. Stainless steel ball and stem.
 - 3. Forged brass, nickel plated body
 - 4. PTFE Seat
 - 5. EPDM O ring
 - 6. Temperature rating: 0 to 250 degrees F.
 - 7. Pressure rating: 400 psi minimum
 - 8. Close-off pressure: 200 psi
 - 9. Maximum differential pressure: 50 psi
- J. Butterfly valves (2 ½" and larger):
 - 1. Belimo F6/7 HD series Trim
 - 2. Stainless steel disc
 - 3. Ductile iron body
 - 4. EPDM liner
 - 5. 0% leakage to 50 psi
- K. Pressure rating: 125 PSI minimum working pressure.

2.7 CONTROLLERS

- A. Manufacturers (Refer to Section 23 05 00):
 - 1. As manufactured by approved EMCS manufacturer.
 - 2. Equipment Controllers
 - a. Stand-Alone Operation: Integral processor, software, hardware, firmware, and memory sufficient to perform complete stand-alone control and operation of associated equipment.
 - b. Expansion: Controllers shall accommodate multiple I/O expansion modules for the possibility of future expansion.
 - c. Operator's Terminal Interface: All point data, algorithms and application software within a controller shall be custom programmable from the operator's terminal.
 - d. Self-Diagnostics: Each controller shall include self-diagnostics, which allow the controller to automatically notify the network controller of any malfunctions or alarm conditions that exceed desired parameters.
 - e. Operator's Interface: Each controller shall contain a port for connection of a portable computer. The entire system shall be accessible from this port.
 - 3. Unitary Controllers
 - a. Stand-Alone Operation: Upon loss of communication, each unitary controller shall execute its assigned control algorithm in a stand-alone mode.
 - b. Zone Temperature Sensor Compatibility: Unitary controllers shall support various types of zone temperature sensors including temperature sensor only, temperature sensor with setpoint adjustment, temperature sensor with local override switch, and temperature sensor with setpoint adjustment and local override switch.
 - c. For applications that require airflow measurement, the unitary controller shall include a precision built-in differential pressure transducer. The differential pressure transducer shall have a measurement range of 0 to 4,000 FPM and measurement accuracy of $\pm 5\%$ at 400 to 4,000 FPM. Controller shall include provisions for manual and automatic calibration of the differential pressure transducer. Automatic calibration shall occur whenever the system mode switches from occupied to unoccupied mode or vice versa.
 - d. VAV Applications: Unitary controller shall be provided with either a separate or integral direct-coupled electronic actuator. The actuator shall be of the on-off floating point control.

The actuator assembly shall mount directly to the damper operating shaft. The actuator shall be electronically protected against overload.

- 1) Provide serviceable air filter in tubing to VAV controller for airflow sensing technology that uses a flow through device that exposes instrumentation to room air.
- e. Serviceability: Controller wiring terminal bars shall be of detachable type allowing quick serviceability of the electronic controller hardware without removal of the existing wiring.

2.8 VARIABLE FREQUENCY DRIVES (VFD'S)

- A. Furnished by the EMCS Contractor in Section 23 09 23 in accordance with Section 23 09 95.

2.9 GENERAL COMPONENTS

- A. Conduit: Conduit shall meet all requirements of the Latest Edition of the National Electrical Code and State Codes and Division 26.
- B. Contactors
 1. Single coil, electrically operated, mechanically held type
 2. Positive locking obtained without the use of hooks, latches or semi-permanent magnets
 3. Doubled break silver to silver type protected by arching contact where necessary
 4. Number and rating of contacts selected for the intended application
 5. Operating and release times shall be 100 milliseconds or less
 6. Equipped with coil transient suppression devices to limit transients to 150 % of rated coil voltage
- C. Electronic Transmitters: Temperature sensing elements shall be thermistor or platinum RTD type as indicated below.
- D. Enclosures: Enclosures shall conform to the requirements of NEMA 250 for the types specified. Finish color shall be the manufacturer's standard, unless otherwise indicated. Damaged surfaces shall be repaired and refinished using original type finish. Enclosures may be NEMA 1 when located in a clean dry indoor environment. Indoor enclosures shall be NEMA 12 when installed in other than a clean dry environment. Equipment installed outdoors shall be housed in a NEMA 4 enclosure. Penetrations shall be sealed to preclude entry of water using a silicone material. All control panels shall be UL listed for code compliance.
- E. Nameplates: Provide laminated plastic nameplates for all equipment and monitoring and control devices in accordance with the requirements of Section 23 05 53. Each nameplate shall identify the function, such as "mixed air controller" or "cold deck temperature sensor". Nameplates shall be in accordance with the requirements of Section 23 05 53.
- F. Power Conditioning
 1. Capacity shall match the equipment served
 2. Output 120 VAC, +6 to -8 % at 90 to 136 VAC input
 3. Maximum 2 % total harmonic wave form distortion
 4. 10 million to 1 common-mode noise attenuation (140dB minimum at 0.0)
 5. 57dB normal-mode noise attenuation for 10 Hz to 1 MHZ
 6. Provide for all solid state equipment unless protection meeting these requirements is an integral part of the equipment.
- G. Relays
 1. General:

- a. Rated for the intended application
 - b. Minimum of 2 sets of Form C contacts
 - c. Enclosed in a dust-proof enclosure
 - d. Rated for a minimum life-cycle of 1,000,000 operations
 - e. 20 milliseconds or less operating time
 - f. 10 milliseconds or less release time
 - g. Equipped with coil transient suppression devices to limit transients to 150 % of rated coil voltage
 2. Enclosed Relays (Relay-in-a-Box) RIB: SPDT enclosed relays with nipple mount for panel applications with LED status pilot light.
 3. DIN Socket Control Relays:
 - a. Plug-in type with dust cover
 - b. Contact rating, configuration, and coil voltage suitable for application
 - c. UL listed
 4. Time Delay Relays:
 - a. Solid state plug-in type with adjustable time delay
 - b. Delay shall be adjustable plus or minus 200 % from setpoint called for
 - c. Contact rating, configuration, and coil voltage suitable for application
 - d. NEMA 1 enclosure when not installed in local control panel
- H. Sensors
1. General: Sensors and control elements shall be rated for continuous operation under the ambient environmental temperature, pressure, humidity, and vibration conditions specified or normally encountered for the installed location.
 2. Provide wall boxes for sensing elements for conduit rough-in with extension rings if required due to finished surfaces on the walls.
 3. Duct Temperature Sensors: Resistor Temperature Detector (RTD) with platinum element and transmitter to match resistance range of RTD or thermistor type, accuracy of 0.1 % at 32 degrees F.
 - a. Use averaging type on mixed air plenums and downstream from heating and cooling coils. Averaging type sensor encased in bendable copper sheath of the length required (normally 24 feet long). Serpentine element horizontally.
 - b. Use direct insertion probe type on return air and supply air ducts. Use 4 inch long probe on terminal box discharge supply ducts. Use 12 inch long probe on main return air and supply air ducts.
 4. Low Limit Thermostats (Freeze stats): Dual signal low temperature cut-out and alarm thermostat with remote sensing element. Manual reset type selected for the application. Bulb shall be approximately 20 feet long for use in large ducts or plenums and shall be designed to stop the respective fan should the temperature drop below setpoint along any one foot length of the bulb. 15 to 55 degrees F adjustable range.
 - a. Provide with two sets of contacts. One to hardwire to equipment for shutdown and one for the DDC system for monitoring.
 5. Outside Air Temperature Sensors: Resistor Temperature Detector (RTD) or thermistor; -20 °F to 180 °F temperature range, sun shield and weatherproof assembly for mounting to rigid conduit.
 - a. Install away from exhaust/relief vents. Preference should be given to locate as near as possible to the outside air intake for the air handling equipment, but keeping it out of direct sunlight or other reflective sources that would adversely affect its accuracy. When possible the sensor should be located on the northwest outside building wall.
 6. Room Temperature Sensors:
 - a. 10K ohm at 77 degrees F thermistor, ±0.5 degrees F accuracy.

- b. Provide with integral communications jack to communicate with the zone's unitary controller.
- c. The contractor shall review with the Owner prior to the submittal of shop drawings the specific sensor types and features. For the purposes of the bid, sensors shall be provided as follows:
 - 1) Sensors in occupied areas:
 - a) LCD display with space temperature and set-points
 - b) Set point adjustment buttons or slider
 - c) Local occupancy over-ride
 - d) Where RH sensors are indicated on plans, provide with integral RH sensing (10% to 90%): +/- 1.8% typical. Less than 0.5% drifter per year.
 - e) Where CO2 sensors are indicated on plans, provide with integral CO2 sensing (400 to 1250 ppm: +/- 30 ppm or 3% of reading whichever is greater) (1250 to 2000 ppm: +/- 5% of reading)
 - 2) Sensors in non-regularly occupied areas shall have blank tamperproof covers with no display, no adjustment and no over-ride. Areas that are not regularly occupied consist of:
 - a) Mechanical, electrical, telecom and elevator machine rooms
 - b) Storage rooms, custodial rooms, restrooms
 - c) Lobbies without reception desk
 - d) Halls
 - e) Egress stairs
 - 3) Temperature sensors in gyms shall be blank, tamperproof covers with no display, adjustment or over-ride. When gymnasiums have CO2 sensors, the sensor shall be combination temperature sensor and CO2 sensors per item 1 above and shall have a wire thermostat guard securely fastened to the wall.
- 7. Immersion Temperature Sensors:
 - a. 10K ohm at 77 degrees F thermistor, ± 0.5 degrees F accuracy.
 - b. Range as suitable for application.
 - c. Provide stainless steel or brass thermowell for threaded mounting into pipe.
 - d. Thermal paste shall be used in all thermowells.
 - e. 4 or 8 inch insertion length depending upon pipe size and mounting configuration available (elbow, lateral or straight).
- 8. Pressure Sensors:
 - a. Air Differential Pressure Sensors:
 - 1) Electronic transducer
 - 2) Linear variable differential transformer type sensing element with two-wire transmitter
 - 3) 2 % of full scale accuracy
 - b. Liquid Differential Pressure Sensors:
 - 1) Single pole, single throw switch
 - 2) Bellows type
 - 3) Adjustable range
 - 4) Suitable for intended application
- I. Switches
 - 1. Current Switches (fan and pump status):
 - a. Self-powered.
 - b. Solid state.
 - c. Adjustable trip current; selected to match the current of the application and output requirements of the EMCS system.

- d. UL listed.
- e. Provide variable frequency drive rated current switches on motors with VFDs.
- 2. Damper End Switches:
 - a. Momentary type limit switches for monitoring motion of the damper at a prescribed arc of rotation.
 - b. Hermetically sealed mercury contacts that operate by way of a trip lever.
 - c. Mounted on the exterior of the duct so that the trip lever is aligned with the damper vane.
 - d. Mechanically adjustable in the switch case to set the proper lever action for tripping the mercury switch contacts.
 - e. SPDT contact arrangement exceeding the load requirements for both voltage and current.
- 3. Air Differential Pressure Switches:
 - a. Snap-acting
 - b. Pilot duty rated (125 VA minimum)
 - c. NEMA 1 enclosure
 - d. Scale range and differential suitable for intended application
 - e. UL listed
 - f. Filter Status: Range 0.05 to 2.0 inches WG, adjustable, SPDT contacts, 15 amps at 277 VAC.
 - g. Duct High Limit: Range 0.40 to 12.0 inches WG adjustable, SPST contacts, 15 amps at 277 VAC, manual reset.
- 4. Emergency Shutdown Switches:
 - a. Mushroom head.
 - b. Red color.
 - c. Non-spring return, or break glass style if indicated on the plans.
- 5. Flow Switches:
 - a. Air Service:
 - 1) Differential pressure type switches as specified above.
 - b. Water Service:
 - 1) Paddle type switch.
 - 2) Snap-acting with pilot duty rating (125 VA minimum).
 - 3) Adjustable sensitivity.
 - 4) NEMA 1 enclosure.
 - 5) UL listed.
 - 6) Alternatively, differential pressure type switches as specified herein.
- 6. Water Differential Pressure Switches:
 - a. General purpose liquid flow switch.
 - b. SPDT snap-acting contacts.
 - c. Adjustable; neoprene diaphragm.
 - d. Dust-tight enclosure.
 - e. 150 PSIG maximum operating pressure.
 - f. 250 degrees F maximum operating temperature.
- J. Sensor Wells
 - 1. Bronze or brass with NPT threads sized to match associated device.
- K. Transformers
 - 1. Current Transformers:
 - a. Current ratio as necessary for application.
 - b. Windings completely enclosed, except for terminals.
 - c. 1 % of full scale accuracy.
 - d. UL listed.

2. Voltage Transformers:
 - a. 600 VAC rated.
 - b. Complete with built-in fuse protection.
 - c. Windings completely enclosed, except for terminals.
 - d. Suitable for ambient temperatures of 40 to 130 degrees F.
 - e. 0.5 % accuracy at 24 VAC.
- L. Transmitters
 1. Current Transmitters:
 - a. Self-powered combination split-core current transformer type with built-in rectifier and high-gain servo amplifier.
 - b. Unit range as necessary for application.
 - c. Internal zero and span adjustment.
 - d. 1 % of full scale accuracy.
 - e. UL listed.
 2. Voltage Transmitters:
 - a. Self-powered single loop type.
 - b. Internal zero and span adjustment.
 - c. 1 % of full scale accuracy.
 - d. UL listed.
- M. Wiring: All wiring shall be compliant to local building codes and the NEC and Division 26 of these specifications.

PART 3 EXECUTION

3.1 EXAMINATION

- A. The project plans shall be thoroughly examined for control device and equipment locations. Any discrepancies, conflicts, or omissions shall be reported to the Architect/Engineer for resolution before rough-in work is started.
- B. The contractor shall inspect the site to verify that equipment may be installed as shown. Any discrepancies, conflicts, or omissions shall be reported to the Architect/Engineer for resolution before rough-in work is started.
- C. The contractor shall examine the drawings and specifications for other parts of the work. If head room or space conditions appear inadequate or if any discrepancies occur between the plans and the Contractor's work and the plans and the work of others, the Contractor shall report these discrepancies to the Engineer and shall obtain written instructions for any changes necessary to accommodate the Contractor's work with the work of others. Any changes in the work covered by this specification made necessary by the failure or neglect of the contractor to report such discrepancies shall be made by this contractor at his expense.
- D. Review shop drawings for equipment being monitored by the EMCS system in the project submittal stage to ensure that equipment arrives with the proper control interface and communications protocol. Provide control integration drawings as previous indicated in part 1 submittal requirements of this section.

3.2 GENERAL

- A. Installation of temperature control system and equipment shall be complete under this section. Provide all required system components and wiring necessary to accomplish the specified sequences of operation as indicated on the drawings.
 - 1. Exception: Components specified to be factory furnished with a particular mechanical equipment item.
- B. All control devices installed in ductwork shall be positively anchored and attached to the ductwork by mechanical means. Duct access panels shall be provided for all such devices.
- C. It shall be the responsibility of this contractor to provide power for all devices requiring power. Coordinate with other trades to arrange for necessary power circuits. All control devices shall obtain power from dedicated control circuits. Provide control voltage transformers for low voltage control power.
- D. Wiring as used herein shall be construed as all wiring, conduits, hangers, etc., required for successful operation of the system. All wiring shall be in strict accordance with the latest edition of the National Electrical Code and local and state electrical code requirements and Division 26.
- E. Install equipment, piping, and wiring/raceways parallel to building lines wherever possible.

3.3 MOTOR CONTROLS

- A. Variable Frequency Drives (VFD's)
 - 1. VFD's furnished in Section 23 09 23 shall be installed in accordance with the requirements of Section 23 09 95.
 - 2. When VFD's are provided by others or as an integral part of the equipment, the control contractor shall attend the field start up and testing of the drives that are provided by others.
- B. Coordinate locations of control relays and installation of work with Division 26.
- C. Safety relays for equipment shutdown are provided by Section 23 09 23. This includes high static, freeze stat, etc. are furnished and installed by Section 23 09 23.
- D. Relays for shutdown for fire alarm conditions are provided by Division 28.

3.4 INSTALLATION

- A. Actuators: All actuators for dampers furnished with air handling units shall be furnished under this Section 23 09 23.
- B. Airflow Measuring Station: Provide in sizes and locations shown on plans.
- C. Control Valves: Valves furnished under this section shall be installed under the Section associated with the piping system in which the valve is being installed. Coordinate with the appropriate piping contractor.
- D. Controllers
 - 1. General: Controllers shall be installed in convenient locations directly on or immediately adjacent to the controlled equipment. If locations are not shown on the drawings, verify location with owner's representative prior to installation.

2. Equipment Controllers: Provide a dedicated controller for each air handling unit or other HVAC system.
 - a. Exception: A single controller can serve multiple air handling units or systems if all points for each individual system are connected to the same system and required spare capacities are maintained as noted below. Points for a single system connected to multiple panels are unacceptable.
 - b. Spare Capacity: Provide a minimum of one AI/AO/DI and DO spare point at each air handler, boiler, and chiller controller. Provide a minimum of 25 % spare capacity on each communication trunk for future use.
 3. Unitary Controllers
 - a. Unitary Controllers shall be provided as required. Unitary controllers serving mechanical equipment that is part of a larger system (e.g. air terminal unit controllers that are part of a VAV system) shall be connected to the EMCS through the equipment controller serving the associated system.
 - b. Air terminal unit controllers furnished under this section shall be shipped to the air terminal unit manufacturer by the EMCS contractor for factory mounting. Controllers and terminal units shall be factory calibrated to provide the maximum and minimum airflow values as indicated in the schedule. Final control connection, checkout, and calibration of factory-mounted controls shall be done at the site under this section. This shall include all terminal unit controllers.
- E. General Components
1. Conduit: Provide as required in the wiring section in complete accordance with the applicable version of the NEC. Conduit terminations shall be free from burrs with a strain relief fitting provided.
 - a. Existing conduit may be re-used.
 2. Nameplates: Provide system and component labeling in accordance with the requirements of Section 23 05 53. All control components, including nameplates, except room temperature sensors shall be equipped with nameplates to identify each control component. Contractor shall submit proposed labeling list prior to installation of labels.
 3. Room temperature sensors and adjustable control devices:
 - a. Adjustable control devices such as sensors, switches and panels for building occupant use shall be
 - 1) Mounted at ADA approved heights (42-48" above finished floor).
 - 2) Coordinate with other local devices such as lighting controls, tackboards, relites and furniture.
 - b. Provide wiring from control to device to equipment being controlled or controller.
 - c. Not all sensors are shown on the floor plans and those shown are preliminary locations only. Consult control diagrams for control device requirements.
 - d. The contractor shall mark all final thermostat locations on-site for approval by the Owner's Representative prior to installation.
 4. Sensors
 - a. General:
 - 1) Mount sensors rigidly and adequately for the environment within which the sensor operates.
 - 2) All wires attached to sensors shall be air-sealed in their raceways or in the wall to stop air transmitted from other areas affecting sensor readings.
 - 3) Duct Temperature Sensors: Averaging type sensors installed in a serpentine manner vertically across the duct. Each bend shall be supported with a capillary clip.

- 4) Low Limit Thermostats: Installed in a serpentine manner horizontally across duct. Each bend shall be supported with a capillary clip. Locate on the inlet side of air handling unit cooling coils close the outside air damper.
 - 5) Outside Air Temperature Sensors: Install on a north wall complete with sun shield. Verify location with the Engineer prior to installation.
 - 6) Pressure Sensors: The piping to the pressure ports on all pressure transducers shall contain a capped test port located adjacent to the transducer.
 - 7) Room Temperature Sensors: Install on concealed junction boxes properly supported by the wall framing.
5. Thermometer Wells: All pipe-mounted temperature sensors shall be installed in wells. Install all liquid temperature sensors with heat-conducting fluid in thermal wells.
6. Transmitters
 - a. Provide for all temperature and pressure sensing
 - b. Serpentine transmitter and controller cap tube averaging elements in mixed air and across coil face to prevent possibility of sensing stratified air
 - c. Provide access panels for temperature transmitters located in return/exhaust ductwork
7. Wiring
 - a. Wiring inside control cabinets shall be dressed neatly and tied with Thomas and Betts wire ties. Plastic tooth wire ties are not acceptable.
 - b. All field wiring entering control cabinets shall be labeled with Thomas and Betts self-laminating wire markers or appropriate alphanumeric labels corresponding to termination shown on the control drawings. Colored phase tape shall not be used.
 - c. Wiring routed from equipment shall be in a manner as to avoid injury to the wiring.
 - d. "Across-the hinge" wiring shall be dressed to avoid strain and abrasion. Provide spiral wrap suitable to this application.
 - e. Install instrumentation grounding as necessary to preclude ground loops and noise from adversely affecting equipment operations.
 - f. Wiring shall be enclosed in conduit in the following conditions:
 - 1) All wiring in mechanical/equipment rooms.
 - 2) Concealed wiring.
 - 3) Outdoor wiring.
 - 4) Wiring mounted on vibrating equipment such as fans and compressors. (Avoid crossing flexible connections or vibration isolation components. Where wiring leaves vibrating equipment, provide ample flexible conduit to permit normal machinery movement.)
 - 5) Wiring routed above ceilings.
 - 6) All wiring associated with smoke control system.
 - 7) Communication wiring.
 - 8) Exception:
 - a) Conduit for wiring above accessible T-bar ceilings may be omitted if approved by local and state electrical code authorities.
 - b) Conduit for wiring in return air plenums may be omitted if approved by local and state electrical code authorities, providing that the contractor utilize plenum rated cable.
 - c) There are no exceptions for wiring associated with a smoke control system. This wiring will be in conduit.
 - g. All wiring requirements noted above apply to communications wiring. The following requirements are intended to be supplemental to those requirements.
 - 1) Communication wiring shall not be installed in raceway and enclosures containing Class 1 or other Class 2 wiring.

- 2) Maximum pulling, tension, and bend radius for cable installation as specified by the cable manufacturer shall not be exceeded during installation.
- 3) Contractor shall verify the integrity of the entire network following the cable installation. Use appropriate test measures for each particular cable.
- 4) Provide a lightning arrestor between the lines and ground wherever a cable enters or exits a building.
- 5) Communication wiring shall be installed in continuous lengths. Spliced wires are not acceptable.
- 6) Grounding of coaxial cable shall be in accordance with NEC Regulations Article on Communications Circuits, Cable and Protector Grounding.
- h. Existing wiring to room temperature sensors may be re-used.
8. Fiber Optic Cabling
 - a. Maximum pulling tensions as specified by the cable manufacturer shall not be exceeded during installation. Post-installation residual cable tension shall be within cable manufacturer's specifications.
 - b. All cabling and associated components shall be installed in accordance with manufacturer's instructions. Minimum cable unjacketed fiber bend radii as specified by cable manufacturer shall be maintained.

3.5 START-UP, CALIBRATION, TESTING AND DEMONSTRATION

- A. Start-up and check-out
 1. Verify that all circuits, controls and devices are properly installed.
 2. Check connectivity of all control points between field devices and controllers. Check and confirm all device addresses and control points.
 3. Verify that all dampers and control valves operate in the correct direction.
 4. Energize the controlled equipment and test for proper operation. Make all necessary adjustments, remove and replace any malfunctioning devices and retest.
- B. Calibration and Adjusting
 1. Calibrate all sensors and devices.
 2. Submit calibration sheets to the Owner's Representative.
 3. Make 3-point calibration test for both linearity and accuracy for each analog device.
 4. Calibrate devices according to manufacturer's directions.
 5. Adjust flow, pressure and temperature switches.
 6. Stroke and adjust control valves and dampers.
 7. Adjust all initial temperature setpoints.
- C. Testing
 1. The completed control system shall be adjusted and tested under operating conditions by a qualified technician in the employ of the EMCS Contractor.
 2. Before commencing the testing, the technician shall prepare an Owner approved, itemized log for the full range of control functions for each system. The log shall be initialed by the test engineer as each test is performed.
 3. When the testing is completed, the test log and a letter of certification stating that all control functions of the system have been checked and are in satisfactory operating order and in compliance with the contract documents shall be given to the Owner.
- D. Programming

1. Coordinate occupied/unoccupied schedule for each unit and zone with the Owner and provide project specific schedules in the programming. Schedules shall include occupied/unoccupied modes with night setback control.
 2. Coordinate occupied and unoccupied setpoints with the owner and adjust in the program. Provide a minimum of 5 degree dead band between heating and cooling setpoints. Initial settings (unless adjusted by owner) shall be as indicated on the drawings.
 3. Provide staggered start-up of equipment after power outage or at morning warm-up to prevent high amp draw on building electrical service.
 4. Equipment shall return to a failsafe unoccupied mode after emergency shutdown (freeze stat, fire alarm etc.) with outside air dampers close and return dampers open.
 5. Provide optimized start on air distribution systems with a supply air capacity exceeding 10,000 cfm served by one or more supply fans. The control algorithm shall, as a minimum, be a function of the difference between the space temperature and occupied setpoint and the amount of time prior to the scheduled occupancy.
 6. Where multiple pieces of equipment serve the same space and have multiple pieces of heating and cooling equipment, controls shall be interlocked through programming to prohibit simultaneous heating and cooling.
 7. For energy and flow metering provided on the project, provide trend logs that indicate total monthly flow/energy and peak monthly demand. The extent of devices capable of power monitoring is indicated on the control diagrams. Device may include:
 - a. VFD's: Monitor of fan energy through VFD interface
 - b. Analog Current transducers
 - c. Flow and btuh through btuh/energy meters
 - d. Water flows from water flow meters
 - e. Chiller energy through serial communication interface
- E. Operator's Terminal
1. All points of control shall be available at the operators terminal (visual and hard copy printout).
 2. Alarms shall register for equipment status or conditions out of setpoint range.
- F. Demonstration
1. The complete and fully operational control system shall demonstrated to the designated Owner's personnel and project engineer upon completion of successful start-up and testing. Demonstration shall be an overview of the entire functionality of the system including the operator's terminal, the web browser interface, the graphical user interface, remote control point adjustment, scheduling procedures, overrides, alarms, unitary and terminal unit control and overall compliance with the specifications.
 2. Demonstration of the system shall occur in order to verify overall compliance with the above start-up and testing.
 3. Demonstration shall be prior to, and in addition to, the required operator training.

3.6 SERVICE AND TROUBLE SHOOTING

- A. Perform the regularly scheduled maintenance service visits as required by Part 1 of these specifications.
- B. Provide warranty service and system troubleshooting as needed during the project warranty period.

3.7 SYSTEM SCHEDULING

- A. During initial set-up and programming of the control system, the EMCS Contractor shall work closely with the Owner's staff to develop and program equipment utilization schedules.
 - 1. Equipment utilization schedules shall allow the Owner to operate groups of equipment in occupied mode based on the use of the building through selection of the appropriate utilization schedule at the Operator's workstation. Any piece of equipment shall have the capability of belonging to more than one utilization schedule.
 - 2. The type and expected duration of the building activities shall dictate which mechanical systems and HVAC equipment must be operational, as well as the appropriate occupied setpoints.

3.8 96-HOUR TEST RUN

- A. The 96-hour test run shall be made when all field equipment is installed and the system is calibrated and running, and when all other building systems (including drywall, windows, doors, etc.) are complete. This period is intended to demonstrate the operation of the complete building.
- B. The 96-hour test run shall include performance of all associated software and hardware operations called for in these specifications. The test shall be for a duration of 96 continuous hours with no Contractor maintenance required. The pre-balance conference shall not be scheduled until this test has been completed satisfactorily (i.e. run without errors or alarms for a continuous 96-hour period). Notify Owner's Representative prior to beginning the 96-hour run test.

3.9 COMMISSIONING REQUIREMENTS

- A. Refer to Section 23 05 00 and Division 01.
- B. Assist with set up of trend logs required by the commissioning agent.

PART 4 SEQUENCE OF OPERATIONS

4.1 SEE CONTROL DIAGRAMS ON DRAWINGS FOR REQUIRED SEQUENCE OF OPERATION.

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Variable Frequency Drives to be furnished by Section 23 09 23 in accordance with this section unless specified or scheduled to be factory furnished with the particular mechanical equipment item.
- B. This specification is to cover a complete Variable Frequency Drive (VFD) consisting of a pulse width modulated (PWM) inverter designed for use with both asynchronous and permanent magnet motors.
- C. The drive manufacturer shall supply the drive and all necessary options as specified. All drives installed on this project shall be from the same manufacturer and have a common user interface (control panel). Drives that are manufactured by a third party and “brand labeled” shall not be acceptable.

1.2 RELATED SECTIONS

- A. Section 23 05 00 – Common Work Results for HVAC
- B. Section 23 05 13 – Common Motor Requirements for HVAC Equipment
- C. Section 23 09 23 – Direct-Digital Control for HVAC
- D. Section 23 73 00 – Indoor Central Station Air Handling Units
- E. Division 26

1.3 SUBMITTALS

- A. Submit in accordance with Section 23 05 00. Submittals shall include the following information:
 - 1. Outline dimensions, conduit entry locations and weights. Customer connection and power wiring diagrams.
 - 2. Seismic certification and installation requirements where applicable.
- B. Complete technical product description with complete list of options provided. Any portions of this specification not met must be clearly indicated or the supplier and contractor shall be liable to provide all additional components required to meet this specification.

1.4 STANDARDS AND GUIDELINES

- A. Institute of Electrical and Electronic Engineers (IEEE): IEEE 519-2014
- B. Underwriters Laboratories (as appropriate): UL 508, 508A, 508C, UL 61800, 61800-5-1, 61800-5-2, UL 1995
- C. The Association of Electrical Equipment and Medical Imaging Manufacturers (NEMA): NEMA ICS 7-2014, Adjustable Speed Drives
- D. International Electrotechnical Commission (IEC): EN/IEC 61800

- E. National Electric Code (NEC): NEC 430.120, Adjustable-Speed Drive Systems
- F. CSA Group: CSA C22.2 No. 274
- G. International Building Code (IBC): IBC 2021 Seismic – referencing ASCE 7-16 and ICC AC-156

1.5 QUALITY ASS7URANCE

- A. Drives shall be UL labeled as a complete assembly. The base VFD shall be UL listed for 100 kA SCCR when installed in accordance with the manufacturer's guidelines.
- B. The base drive shall be CE and meet EN 61800-3 for the First Environment restricted distribution (Category C2).
- C. The base drive shall be seismically certified per 2021 International Building Code (IBC) with a seismic importance factor of 1.5, and minimum 2.5 S_{DS} rating.
- D. The base drive shall be SEMI-F47 certified. The drive must tolerate voltage sags to 50% for up to 0.2 seconds, sags to 70% for up to 0.5 seconds, and sags to 80% for up to one second.
- E. Product Support
 - 1. Factory trained support personnel shall be locally available at both the specifying and installation locations. A toll free 24/365 technical support line connected to factory support personnel located in the US and Canada shall be available.
 - 2. Factory training of support personnel shall include installation, programming and operation of the drive, bypass and network communications.
- F. Service
 - 1. Manufacturer shall maintain a service center or service representative within 150 miles of the job site. This center must normally provide the following services:
 - a. Factory coordinated start-up service.
 - b. Perform service calls and providing replacement parts within twenty-four (24) hours.
 - c. Provide service contracts.
 - d. Training of customers in operation and basic troubleshooting.
 - e. Maintaining a stock of frequently replaceable parts at a local warehouse.

1.6 WARRANTY

- A. Warranty shall be provided for the greater duration of the two following conditions:
 - 1. Warranty required in divisions 00 and 01
 - 2. The drive Product Warranty shall be 30 months from the date of shipment from the factory. The warranty shall include: Parts, on-site labor, and travel time and travel costs, or replacement of the complete drive as determined by the drive manufacturer's technical support.

PART 2 PRODUCTS

2.1 VARIABLE FREQUENCY DRIVES (FULLY FEATURED)

- A. Manufacturers (refer to 23 05 00):
 - 1. ABB, ACH 580 Series
 - 2. Danfoss

- B. Application/Use: All drives
- C. The drive package as specified herein and defined on the drive schedule shall be enclosed in a UL Type enclosure (enclosures with only NEMA ratings are not acceptable), completely assembled and tested by the manufacturer to ISO9001 standards.
- D. The drive shall provide full rated output from a line of +10% to -15% of nominal voltage. The drive shall continue to operate without faulting from a line of +25% to -35% of nominal voltage.
 - 1. Unless scheduled otherwise on the drawings, drives shall be capable of continuous full load operation under the following environmental operating conditions:
 - a. Ambient temperature -15 to 40° C (5 to 104° F).
 - b. Altitude 0 to 1000 m (0 to 3,300 ft) above sea level.
 - c. Humidity 5 to 95%, non-condensing.
- E. All drives shall utilize the same Advanced Control Panel (keypad) user interface.
 - 1. Plain English text
 - a. The display shall be in complete English words for programming and fault diagnostics (alpha-numeric codes are not acceptable).
 - b. Safety interlock and run permissive status shall be displayed using predetermined application specific nomenclature, such as: Damper end switch, smoke alarm, vibration trip, and overpressure.
 - c. Safety interlock, run permissive, and external fault status shall have the option of additional customized project specific terms, such as: AHU-1 End Switch, Office Smoke Alarm, CT-2 Vibration.
 - 2. The control panel shall include at minimum the followings controls:
 - a. Four navigation keys (Up, Down, Left, Right) and two soft keys to simplify operation and programming.
 - b. Hand-Off-Auto selections and manual speed control without having to navigate to a parameter.
 - c. Fault Reset and Help keys. The Help key shall include assistance for programming and troubleshooting.
 - 3. Multiple Home View screens shall be capable of displaying up to 21 points of information. Customizable modules shall include bar charts, graphs, meters, and data lists. Displays shall provide real time graphical trending of output power, frequency, and current within selectable intervals of 15/30/60 minutes and 24 hours.
 - 4. The control panel shall display the following items on a single screen; output frequency, output current, reference signal, drive name, time, and operating mode (Hand vs Auto, Run vs Stop). Bi-color (red/green) status LED shall be included. Drive (equipment) name shall be customizable.
 - 5. There shall be a built-in time clock in the control panel. The clock shall have a battery backup with 10 years minimum life span. Daylight savings time shall be selectable.
 - 6. I/O Summary display with a single screen shall indicate and provide:
 - a. The status/values of all analog inputs, analog outputs, digital inputs, and relay outputs. Drives that require access to internal or live components to measure these values, are not acceptable.
 - b. The programmed function of all analog inputs, analog outputs, digital inputs, and relay outputs.
 - c. The ability to force individual digital I/O high or low and individual analog I/O to desired value, for increased personal protection during drive commissioning and troubleshooting. Drives that require access to internal or live components to perform these functions, are not acceptable.

7. The drive shall automatically backup parameters to the control panel. In addition to the automatic backup, the drive shall allow two additional unique backup parameter sets to be stored. Backup files shall include a time and date stamp. In the event of a drive failure, the control panel of the original drive can be installed on the replacement drive, and parameters from that control panel can be downloaded into the replacement drive.
 8. The control panel shall display local technical support contact information as part of drive fault status.
 9. The control panel shall be removable, capable of remote mounting.
 10. The control panel shall have the ability to store screen shots, which are downloadable via USB.
 11. The control panel shall have the ability to display a QR code for quick access to drive information.
 12. The LCD screen shall be backlit with the ability to adjust the screen brightness and contrast, with inverted contrast mode. A user-selectable timer shall dim the display and save power when not in use.
 13. The control panel shall include assistants specifically designed to facilitate start-up. Assistants shall include: First Start Assistant, Basic Operation, Basic Control, and PID Assistant.
 14. Primary settings for HVAC shall provide quick set-up of all parameters and customer interfaces to reduce programming time.
 15. The drive shall be able to operate with the control panel removed.
 16. The drive shall be able to support a Bluetooth Advanced Control Panel. The Bluetooth control panel shall be FCC and QDL (Qualified Design Listing) certified.
 - a. A free app (iOS and Android) shall replicate the control panel on a mobile device or tablet. The control panel's programming and control functionality shall function on the device. Customizing text, such as AHU-1 End Switch, shall be supported by the device's keyboard.
 - b. Bluetooth connectivity shall allow uploading, downloading, and emailing of parameter sets.
 - c. Bluetooth connectivity shall include two pairing modes: Always discoverable with a fixed passcode, and manual discovery with a unique generated passcode every pairing.
 - d. The Bluetooth antenna shall be in the control panel. Antennas that are integrated in the drive's control board, must include an external antenna, on all drives mounted inside cabinets.
 - e. Bluetooth connectivity shall be capable of being switched off.
- F. All drives shall have the following hardware features/characteristics as standard:
1. Two (2) programmable analog inputs shall accept current or voltage signals. Current or Voltage selection configured via control panel. Drives that require access to internal components to perform these functions, are not acceptable.
 2. Two (2) programmable analog outputs. At least one of the analog outputs shall be adjustable for current or voltage signal, configured via control panel. Drives that require access to internal components to perform these functions, are not acceptable.
 3. Six (6) programmable digital inputs. All digital inputs shall be programmable to support both active high and active low logic, and shall include adjustable on/off time delays. The digital input shall be capable of accepting both 24 VDC and 24 VAC.
 4. Three (3) programmable Form-C relay outputs. The relay outputs shall include programmable on/off time delays. The relays shall be rated for a continuous current rating of 2 Amps. Maximum switching voltage of 250 VAC / 30 VDC. Open collector and Form-A relays are not acceptable. Drives that have less than (3) Form-C relay outputs shall provide an option card to provide additional relay outputs.
 5. Drive terminal blocks shall be color coded for easy identification of function.

6. The drive shall include an isolated USB port for interface between the drive and a laptop. A non-isolated USB port is not acceptable.
7. An auxiliary power supply rated at 24 VDC, 250 mA shall be included.
8. At a minimum, the drives shall have internal impedance equivalent to 5% to reduce the harmonics to the power line. 5% impedance may be from dual (positive and negative DC link) chokes, or AC line reactor. Drives with only one DC link choke shall add an AC line choke integral to the drive enclosure.
 - a. On select projects, additional harmonic mitigation will be required. Reference the drive schedule to determine if additional harmonic mitigation is required for the system to comply with IEEE 519-2014. Additional harmonic mitigation, if required, will be identified by the project electrical engineer.
9. The drive shall have cooling fans that are designed for field replacement. The primary cooling fan shall operate only when required and be variable speed for increased longevity and lower noise levels. Drives whose primary cooling fans are not variable speed, shall include a spare cooling fan.
10. The overload rating of the drive shall be 110% of its normal duty current rating for 1 minute every 10 minutes, 130% overload for 2 seconds every minute. The minimum current rating shall meet or exceed the values in the NEC/UL table 430.250 for 4-pole motors.
11. The input current rating of the drive shall not be greater than the output current rating. Per NFPA 70 430.122, drives with higher input current ratings may require the upstream wiring, protection devices, and source transformers to be upsized.
12. Circuit boards shall be coated per IEC 60721-3-3; Chemical gasses Class 3C2 and Solid particles Class 3S2.
13. Earth (ground) fault detection shall function in both modulating (running) and non-modulating modes.
14. Surge protection device provided in accordance with UL 14449.
15. Coordinated AC transient surge protection system consisting of 4 MOVs (phase-to-phase and phase-to-ground), a capacitor clamp, and internal chokes. The MOVs shall comply with UL 1449 4th Edition. Drives that do not include coordinated AC transient surge protection shall include an external TVSS/SPD (Transient Voltage Surge Suppressor/Surge Protection Device).
16. The drive shall include a robust DC bus to provide short term power-loss ride through. The DC bus Joule to drive kVA ratio shall be 4.5 J/kVA or higher. An inertia-based ride through function should help maintain the DC bus voltage during power loss events. Drives with control power ride through only, are not acceptable.

All VFD's shall include EMI/RFI filters. The onboard filters shall allow the VFD assembly to be CE Marked and the VFD shall meet product standard EN 61800-3 for the Second Environment restricted level with up to 100 feet of motor cable. No Exceptions. Certified test reports shall be provided with the submittals confirming compliance to EN 61800-3, Second Environment.

- G. All drives shall have the following software features as standard:
1. A Fault Logger that stores the last 16 faults in non-volatile memory.
 - a. The most recent 5 faults save at least 9 data points, including but not limited to: Time/date, frequency, DC bus voltage, motor current, DI status, temperature, and status words.
 - b. The date and time of each fault and fault reset attempt shall be stored in the Fault Logger.
 2. An Event Logger that stores the last 16 warnings or events that occurred, in non-volatile memory.
 - a. Events shall include, but not limited to: Warning messages, checksum mismatch, run permissive open, start interlock open, and automatic reset of a fault.
 - b. The date and time of each event's start and completion points shall be stored in the Event Logger.

3. Programmable start method. Start method shall be selectable based on the application: Flying-start, Normal-start, and Brake-on-start.
4. Programmable loss-of-load (broken belt / coupling) indication. Indication shall be selectable as a control panel warning, relay output, or over network communications. This function to include a programmable time delay to eliminate false loss-of-load indications.
5. Motor heating function to prevent condensation build up in the motor. Motor heating adjustment, via parameter, shall be in "Watts." Heating functions based only on "percent current" are not acceptable.
6. Advanced power metering abilities shall be included in the drive. Drives without these data points, must include a separate power meter with each drive.
 - a. Instantaneous output power (kW)
 - b. Total power, broken down by kWh, MWh, and GWh units of measurement. Power meters that only display kWh and roll over or "max out" once the maximum kWh value is reached, are not acceptable. There shall be resettable and non-resettable total power meters within the drive.
 - c. Time based kWh metering for: current hour, previous hour, current day, and previous day.
 - d. Energy saving calculation shall be included that shows the energy and dollars saved by the drive.
7. The drive shall include a motor flux optimization circuit that will automatically reduce applied motor voltage to the motor to optimize energy consumption and reduce audible motor noise.
8. Run permissive circuit - There shall be a run permissive circuit for damper or valve control. Regardless of the source of a run command, the Drives shall provide a dry contact closure that will signal the damper to open. When the damper is fully open, an end-switch shall close, allowing the drive to run the motor.
 - a. The drive shall also include a programmable start delay, for when an end-switch is not provided.
9. Start interlock circuit - Four separate start interlock (safety) inputs shall be provided. When any safety is opened, the motor shall be commanded to stop. The control panel will display the specific safety(s) that are open. The status of each safety shall be transmitted over the network communications. Wiring multiple safeties in series is not acceptable.
10. External fault circuit – Three separate external fault inputs shall be provided. This circuit shall have the same features and functionality as the start interlock circuit, except it shall require a manual reset before the drive is allowed to operate the motor.
11. The drive shall include a switching frequency control circuit that reduces the switching frequency based on actual drive temperature, and allows higher switching frequency settings without derating the drive. It shall be possible to set a minimum and a target switching frequency.
12. Visual function block adaptive programming allowing custom control schemes, minimizing the need for external controllers. i.e. cooling tower staging logic. A free software tool shall be used to configure adaptive programming.
13. The ability to automatically restart after an over-current, over-voltage, under-voltage, external fault, or loss of input signal protective trip. The number of restart attempts, trial time, and time between attempts shall be programmable. Each of these faults may have automatic restart individually disabled via a parameter selection.
14. Three (3) programmable critical frequency lockout ranges to prevent the drive from operating the load continuously at an unstable speed/load.
15. Seven (7) programmable preset frequencies/speeds.
16. Two independently adjustable accel and decel ramps with 1 – 1800 seconds adjustable time ramps.
17. PID functionality shall be included in the drive.
 - a. Programmable "Sleep" and "Wake up" functions to allow the drive to be started and stopped based on the level of a process feedback signal.

- b. The drive shall include an independent PID loop for customer use, assigned to an Analog Output. This PID loop may be used for cooling tower bypass valve control, chilled water valve, etc.
 - 18. At least 4 parameter user sets that can be saved to the permanent memory and recalled using a digital input, timed function, or supervision function.
 - 19. Drive shall be compatible with an accessory that allows the control board to be powered from an external 24 VDC/VAC source, allowing the drive control to remain powered by a UPS during an extended power outage.
 - 20. A computer-based software tool shall be available to allow a laptop to program the drive. The drive shall be able to support programming without the need for line voltage. All necessary power shall be sourced via the laptop USB port.
 - 21. The drive shall include a fireman's override mode. Upon receipt of a contact closure from the Fire Alarm Life Safety system, the drive shall operate in a dedicated Override mode distinct and separate from the drive's Normal operation mode. The following features will be available in the drive override function:
 - a. The Override mode shall be secured by password to prevent changes once programmed.
 - b. The drive shall ignore external inputs and commands not defined as part of the override function.
 - c. Override operation mode shall be selectable between: single frequency, multiple fixed frequencies, follow an analog input signal, PID control, or come to a forced stop.
 - d. High priority safeties shall stop the drive and lower priority safeties shall be ignored in Override mode.
 - e. Drive faults shall be defined in Critical and Low priority groups. Critical faults shall stop the drive. Low priority faults shall be reset. Reset trials and timing shall be programmable.
 - f. The drive shall be configurable to receive from 1 to 3 discrete digital input signals and operate at up to three discrete speeds.
 - 22. The drive shall have multi-pump functionality and an intelligent master/follower configuration for controlling up to 8 parallel pumps equipped with drives. The drive shall have a parameter synchronization feature to program the PID, multi-pump, and AI parameters in all parallel drives. The functionality to start and stop the pumps based on capacity, operating time or efficiency of the pump to ensure each pump is operated regularly.
 - a. The multi-pump functionality shall control:
 - 1) Flow Control
 - 2) Pressure Control
 - 3) Pump Alternation
- H. Security Features
- 1. The drive manufacture shall clearly define cybersecurity capabilities for their products.
 - 2. The drive shall include password protection against parameter changes.
 - a. There shall be multiple levels of password protection including: End User, Service, Advanced, and Override.
 - b. The drive shall support a customer generated unique password between 0 and 99,999,999.
 - c. The drive shall log an event whenever the drive password has been entered.
 - d. The drive shall provide a security selection that prevents any "back door" entry. This selection even prevents the drive manufacturer from being able to bypass the security of that drive.
 - e. A security level shall be available that prevents the drive from being flashed with new firmware.

3. A checksum feature shall be used to notify the owner of unauthorized parameter changes made to the drive. The checksum feature includes two unique values assigned to a specific programming configuration.
 - a. One checksum value shall represent all user editable parameters in the drive except communication setup parameters. A second checksum value shall represent all user editable parameters except communication setup, energy, and motor data parameters.
 - b. Once the drive has been commissioned the two values can be independently saved in the drive.
 - c. The drive shall be configurable to either: Log an Event, provide a Warning, or Fault upon a parameter change when the current checksum value does not equal the saved checksum value.
 4. The “Hand” and “Off” control panel buttons shall have the option to be individually disabled (via parameter) for drives mounted in public areas.
 5. The capability to disable Bluetooth on control panels that include Bluetooth functionality shall be provided.
- I. Network Communications
1. The drive shall have an EIA-485 port with removable terminal blocks. The onboard protocols shall be BACnet MS/TP, Modbus, and Johnson Controls N2. Optional communication cards for BACnet/IP, LonWorks, Profibus, Profinet, EtherNet/IP, Modbus TCP, and DeviceNet shall be available. The use of third party gateways are not acceptable.
 2. The drive shall have the ability to communicate via two protocols at the same time, one onboard protocol and one option card based protocol. Once installed, the drive shall automatically recognize any optional communication cards without the need for additional programming.
 3. The drive shall not require a power cycle after communication parameters have been updated.
 4. The embedded BACnet connection shall be a MS/TP interface. The drive shall be BTL Listed to Revision 14 or later. Use of non-BTL Listed drives are not acceptable.
 5. The drive shall be classified as an Applications Specific Controller (B-ASC). The interface shall support all BIBBs defined by the BACnet standard profile for a B-ASC including, but not limited to:
 - a. Data Sharing: Read Property Multiple-B, Write Property Multiple-B, COV-B
 - b. Device Management: Time Synchronization-B
 - c. Object Type Support: MSV, Loop
 6. The drive’s relay output status, digital input status, analog input/output values, Hand-Auto status, warning and fault information shall be capable of being monitored over the network. The drive’s start/stop command, speed reference command, relay outputs and analog outputs shall be capable of being controlled over the network. Remote drive fault reset shall be possible.
- J. Options (see schedule on drawings where applies):
1. Disconnect – A circuit breaker or disconnect switch shall be provided when indicated on the drive schedule. The disconnect shall be door interlocked and padlockable. Drive input fusing shall be included on all packaged units that include a disconnecting means. All disconnect configurations shall be UL Listed by the drive manufacturer as a complete assembly and carry a UL508 label. Disconnect packages manufactured by anyone other than the drive manufacturer, are not acceptable.
 2. Bypass – Bypass drive packages shall be provided when indicated on the drive schedule. All drive/bypass configurations shall be UL Listed by the drive manufacturer as a complete assembly and carry a UL508 label. Bypasses manufactured by anyone other than the drive manufacturer, are not acceptable.

- a. The drive and bypass package shall be a complete factory wired and tested bypass system consisting of a padlockable disconnect device, drive output contactor, bypass contactor, and drive input fuses.
- b. The drive and bypass package shall have a UL listed short circuit current rating of 100 kA, for 240 VAC and 480 VAC systems, and this rating shall be indicated on the rating label.
- c. The bypass control shall be powered by a three-phase switch mode power supply with a voltage tolerance of +30%, -35%. Single-phase power supplies and control power transformers (CPT) are not acceptable.
- d. The drive and bypass package shall be seismic certified and labeled to the IBC. Seismic importance factor of 1.5 rating is required, and shall be based upon actual shake table test data as defined by ICC AC-156. Seismic certification of equipment and components shall be provided by OSHPD preapproval.
- e. All bypass packages shall utilize a dedicated LCD bypass control panel (keypad) user interface. The bypass control panel must be a separate display from the drive control panel. Bypass packages that use a single shared drive/bypass control panel are not acceptable, due to that control panel acting as a single point of failure.
 - 1) The bypass shall include a two-line, 20-character LCD display. The display shall allow the user to access parameters and view:
 - a) Bypass input voltage, current (Amps) and power (kW)
 - b) Bypass faults, warnings, and fault logs
 - c) Bypass operating time and energy consumption (resettable)
 - 2) The bypass control panel shall include the following controls:
 - a) Four navigation keys (Up, Down, Enter, Escape)
 - b) Bypass Hand-Off-Auto, Drive mode / Bypass mode selectors, Bypass fault reset
 - 3) The following indicating lights (LED PTT type) or control panel display indications shall be provided.
 - a) Drive mode selected, Bypass mode selected
 - b) Drive running, Bypass running
 - c) Drive fault, Bypass fault
 - 4) Safety interlock and run permissive status shall be displayed using predetermined application specific nomenclature, such as: Damper end switch, smoke alarm, vibration trip, and overpressure.
- f. All bypasses shall have the following hardware features/characteristics as standard:
 - 1) Six (6) digital inputs and five (5) Form-C relay outputs. The digital inputs shall be capable of accepting both 24 VDC and 24 VAC. The bypass control board shall include an auxiliary power supply rated 24 VDC, 250 mA.
 - 2) Drive isolation fuses shall be provided. Bypass designs which have no such fuses, or that only incorporate fuses common to both the drive and the bypass are not acceptable. Third contactor "isolation contactors" and service switches are not an acceptable alternative to drive isolation fuses.
 - 3) The bypass shall be able to detect a single-phase input power condition while running in bypass, disengage the motor, and provide a single-phase input power indication.
 - 4) The bypass shall be designed for stand-alone operation and be completely functional in both Hand and Automatic modes, even if the drive and/or drive's control board has failed. Network communications shall remain functional. Bypass systems that do not maintain full functionality in the event of a drive failure, are not acceptable.
- g. All bypasses shall have the following software features as standard:

- 1) Programmable loss-of-load (broken belt / coupling) indication shall be functional in drive and bypass mode.
- 2) The bypass shall also support run permissive and start interlock control functionality, including start delay, as previously specified in the drive section.
- 3) The bypass control shall monitor the status of the drive and bypass contactors and indicate when there is a welded contactor contact or open contactor coil.
- 4) The bypass shall include a selection for either manual or automatic transfer to bypass. The automatic transfer mode shall allow the user to select the specific drive fault types that result in an automatic transfer to bypass. The automatic transfer mode shall not allow a transfer to bypass on motor related faults. Automatic transfer schemes that do not differentiate between fault types, are not acceptable.
- 5) The bypass shall include the ability to select the operating mode of the system (Drive/Bypass) from either the bypass control panel or digital input.
- 6) The bypass shall include a supervisory control mode that monitors the value of the drive's analog input (feedback). This feedback value is used to control the bypass contactor on/off state. The supervisory mode shall allow the user to maintain hysteresis control over applications such as cooling towers and booster pumps.
- 7) Selectable Class 10, 20, or 30 electronic motor overload protection shall be included in both drive and bypass mode.
- 8) The drive and bypass shall be designed to operate as an integrated system when in Override mode. Whether operating in drive or bypass mode, the low priority safeties will be ignored, and high priority safeties will be followed. External start/stop commands will be ignored. There shall be four selectable Override modes:
 - a) Bypass only, with two smoke control modes:
 - (1) Fixed pre-configuration of digital inputs
 - (2) Configurable high/low priority safeties and faults, to allow configuration to meet needs of local Authority Having Jurisdiction.
 - b) Drive only
 - c) Drive then transfer to bypass, in the event of a drive fault
 - d) Force to Stop
- h. Network communications – the bypass shall include BACnet MS/TP, Modbus, and Johnson Controls N2 as standard. The bypass BACnet implementation shall be BTL Listed to Revision 14 or later. Optional communication cards for BACnet/IP, LonWorks, Profibus, Profinet, Ethernet/IP, Modbus TCP, and DeviceNet shall be available.
 - 1) The bypass relay output status, digital input status, warning and fault information can be monitored over the network. Status information shall be monitored, including operating mode (drive vs bypass), current drawn in bypass mode, broken belt, and phase-to-phase voltage. The bypass start/stop command, force to bypass command, and relay outputs shall be capable of being controlled over the network.

PART 3 EXECUTION

3.1 EXECUTION

A. Sizing:

1. The drives shall be sized as required by the scheduled motors. See Mechanical and the Mechanical Drawing Schedules for motor information.

2. The drives shall be sized to continually operate the motors at continuously at the full rated horsepower at conditions scheduled on the drawings.
 3. Either a variable or constant torque drive shall be selected based on the application and shall be provided as specified for each application.
- B. Installation and Field Wiring:
1. Mounting and power wiring and power terminations shall be provided by Division 26.
 2. Control wiring and control terminations shall be provided by Section 23 09 23.
 3. The variable frequency drives on air distribution equipment shall be installed out of the airstream so that setup and testing can be accomplished without disrupting system pressures and airflows. In some applications where is not practical, such as packaged equipment, the drives shall be furnished with a remote mounting keypad which shall be installed in the controls section of the cabinet or other suitable enclosure on the side of the unit.
- C. Field Start Up and Testing
1. The start-up and testing is to be provided at the installation site by the manufacturer or other agent deemed acceptable by the Owner's Representative.
 2. Verify all installation connections and controls.
 3. Field adjust all safety controls.
 - a. For all drives with thermal overload protection, set and adjust drive program to thermally protect motor from overload conditions.
 - b. Check fuses for proper thermal protection of drive.
 4. Field adjust all drive parameters (including acceleration and deceleration ramps and volts-to-hertz ratio for smooth operation).
 5. For all drives with remote disconnect, confirm that local disconnect has an auxiliary switch and that the switch is wired to the drive to interrupt the drive when local disconnect is used to de-energize equipment. Interconnecting wiring provided by division 26.
 6. All mechanical components shall be adjusted for proper alignment.
 7. Demonstrate satisfactory operation of drive including line reactors, filters, and the bypass contactor under full load rpm.
 8. Submit start-up and test report in accordance with Section 23 05 00.
- D. Training
1. Provide in accordance with section 23 05 00.
 2. Provide on-site operation and maintenance training by manufacturer or other agent deemed acceptable by the Owner's Representative.

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Heating Water, Chilled Water, Above Grade
- B. Unions, Flanges and Couplings

1.2 RELATED SECTIONS

- A. Section 23 05 00 – Common Work Results for HVAC
- B. Section 23 05 19 – Meters and Gauges for HVAC Piping
- C. Section 23 05 29 – Hangers and Supports for HVAC Piping and Fittings
- D. Section 23 05 48 – Vibration Controls for HVAC
- E. Section 23 05 53 – Identification for HVAC Piping and Equipment
- F. Section 23 07 00 – HVAC Insulation
- G. Section 23 09 23 – Direct-Digital Control for HVAC
- H. Section 23 21 16 – Hydronic Piping Specialties
- I. Section 23 25 00 – HVAC Water Treatment

1.3 REFERENCES

- A. General
 - 1. ASME - Boiler and Pressure Vessel Codes, SEC 9 - Qualification Standard for Welding and Brazing Procedures, Welders, Brazers, and Welding and Brazing Operators
 - 2. ASME B16.3 - Malleable Iron Threaded Fittings Class 150 and 300
 - 3. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings
 - 4. ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings
 - 5. ASME B31.9 - Building Services Piping
 - 6. ASTM A53 - Pipe, Steel, Black and Hot-Dipped, Zinc Coated Welded and Seamless
 - 7. ASTM A234 - Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures
 - 8. ASTM B32 - Solder Metal

1.4 GENERAL

- A. All materials shall be compatible with ethylene and propylene glycol.

1.5 SUBMITTALS FOR REVIEW (REFER TO SECTION 23 05 00)

- A. Product Data: Include data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalogue information. Indicate valve data and ratings.

1.6 PROJECT RECORD DOCUMENTS (REFER TO SECTION 23 05 00)

- A. Record actual locations of piping.

1.7 REGULATORY REQUIREMENTS

- A. Conform to ASME B31.9 code for installation of piping system.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect and handle products to site under provisions of Section 23 05 00.
- B. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- C. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

1.9 TESTING (REFER TO SECTION 23 05 00)

- A. Test in the presence of the Owner's Representative.
- B. Systems:
 - 1. Heating Water
 - 2. Chilled Water
- C. Above Grade Piping Test
 - 1. Piping systems shall be tested with a hydrostatic test of not less than 125 psig. Due care shall be taken that equipment with a maximum working pressure which is less than the required test is removed from the line during the test. After the test is complete, the equipment shall be reinstalled and a test of the maximum working pressure of the equipment put on the connections to the respective equipment.
 - 2. Test piping prior to insulating.
- D. Submit certificate of tests to the Owner's Representative for review.
- E. Include certificate of tests in the Operation and Maintenance manual.

PART 2 PRODUCTS

2.1 HEATING WATER AND CHILLED WATER (ABOVE GRADE)

- A. Up to and including 2 inches:
 - 1. Copper tubing: ASTM B88; type L; hard drawn; fittings: solder wrought copper fittings, ASME B16.22; ASTM B32, 95-5 tin-antimony or tin and silver solder with melting range of 430 to 535 °F, lead-free. Fittings shall be full nominal diameter inside and long radius.
 - 2. Steel: ASTM A53; schedule 40 black; ASME B16.3 malleable iron fittings; 125 psi; threaded joints
- B. Pipe over 2 inches:
 - 1. ASTM A53; schedule 40 black; ASTM A234 forged steel welding type fittings

2. Copper pipe; ASTM B88; type L; hard drawn; soldered; ASME B16.22, Solder wrought copper fittings; ASTM B32, 95-5 tin-antimony, or tin and silver solder joints with melting range of range 430 to 535 °F, lead free.

2.2 PIPE HANGERS AND SUPPORTS

- A. Materials shall in accordance with Section 23 05 29.

2.3 UNIONS, FLANGES, AND COUPLINGS

- A. Unions for Pipe 2 inches and under: 150 psig threaded malleable for ferrous piping; bronze with soldered joints for copper pipe.
- B. Flanges for Pipe over 2 inches: 150 psig forged steel slip-on for ferrous piping; bronze for copper piping; gaskets to suit application for system temperature, pressure, and fluid type.
- C. Dielectric Connections: Union with galvanized or plated steel threaded end; copper solder end; water impervious isolation barrier.

PART 3 EXECUTION

3.1 PREPARATION

- A. Ream pipe and tube ends. Remove burrs.
- B. Remove scale and dirt on inside and outside before assembly.
- C. Prepare piping connections to equipment with flanges or unions.
- D. Keep open ends of pipe free from scale and dirt. Protect open ends with temporary plugs or caps.
- E. After completion, fill, clean, and treat systems. Refer to Section 23 25 00.
- F. Provide temporary piping connections for use in cleaning and flushing provided in Section 23 25 00.

3.2 INSTALLATION – GENERAL

- A. Provide pipe as indicated on the drawings.
- B. Install in accordance with manufacturer's instructions and ASME B31.9.
- C. Route piping in orderly manner, parallel to building structure, and maintain gradient.
- D. Provide piping and all required offsets and fittings in order to coordinate with other trades, minimize structural inferences, conserve space, and maintain headroom. Refer to Section 23 05 00 – Common Work Results for HVAC, paragraph Locations.
- E. Group piping whenever practical at common elevations.
- F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

- G. Provide supports, hangers (and spacing), insulation, shields, sleeves, escutcheons, and inserts in accordance with Section 23 05 29.
- H. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings. Refer to Section 23 07 00.
- I. Slope piping and arrange systems to drain at low points. Use eccentric reducers to maintain top of pipe level.
- J. Install control valves, sensor wells, flow meters, and any other hydronic devices provided under Section 23 09 23 in accordance with the manufacturer's recommendations. Provide piping to hydronic differential pressure sensors provided under Section 23 09 23. Control devices are sized in 23 09 23. Provide adaptors from valve size to pipe size in the piping immediately at the valve connection points.
- K. Where more than one piping system material is specified, ensure system components are compatible and joined to ensure the integrity of the system is not jeopardized. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.
- L. Flanges / Unions:
 - 1. Steel Pipe:
 - a. Threaded pipe, 2 inches smaller: Install unions downstream of each valve with screwed joint upstream
 - b. Welded pipe, 2 ½ inches and larger: Flanged connections both sides of valve
 - c. Use unions at final connection to each piece of equipment or apparatus having a threaded pipe connection.
 - d. Use flanges at final connection to each piece of equipment or apparatus having a flanged pipe connection.
 - 2. Copper Pipe:
 - a. Threaded pipe: Install union down stream of each valve with screwed joint up stream. Use brass male adapters each side of valve.
 - b. Soldered pipe: No unions required either side of valve.
 - c. Use unions at final connection to each piece of equipment or apparatus having a threaded pipe connection.
 - d. Use flanges at final connection to each piece of equipment or apparatus having a flanged pipe connection.
 - 3. Notes to above: Temperature control valves shall have unions and/or flanges at each port. Valves with screwed connections that cannot be rotated shall have unions on each side of valve. Do not use direct welded or threaded connections to valves, equipment or other apparatus.
- M. Use non-conducting dielectric connections whenever jointing dissimilar metals.

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Air separators
- B. Air vents
- C. Balancing cocks
- D. Coil piping packages
- E. Expansion tanks
- F. Flow control balancing valves (automatic)
- G. Relief valves
- H. Strainers
- I. Venturis

1.2 RELATED SECTIONS

- A. Section 23 05 00 – Common Work Results for HVAC
- B. Section 23 05 23 – General Duty Valves for HVAC Piping
- C. Section 23 21 13 – Hydronic Piping
- D. Section 23 25 00 – HVAC Water Treatment

1.3 REFERENCES

- A. ASME - Boilers and Pressure Vessel Codes, SEC 8-D-Rules for Construction of Pressure Vessels

1.4 SUBMITTALS FOR REVIEW (REFER TO SECTION 23 05 00)

- A. Product Data: Provide product data for manufactured products and assemblies required for this project. Include component sizes, rough-in requirements, service sizes, and finishes. Include product description, model and dimensions.
- B. Furnish a manufacturer's data report for Pressure Vessels, Form U-1 as required by ASME Boiler Pressure Vessel Code for each compression and expansion tanks.
- C. Submit Selections and sizing for all flow balancing valves.

1.5 PROJECT RECORD DOCUMENTS (REFER TO SECTION 23 05 00)

- A. Record actual locations of equipment and devices furnished under this section.

1.6 OPERATION AND MAINTENANCE DATA (REFER TO SECTION 23 05 00)

- A. Maintenance Data: Include installation instructions, assembly views, lubrication instructions, and replacement parts list.

1.7 DELIVERY, STORAGE, AND HANDLING (REFER TO SECTION 23 05 00)

- A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
- B. Provide temporary protective coating on cast iron and steel valves.
- C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- D. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

PART 2 PRODUCTS

2.1 AIR SEPARATORS

- A. Manufacturers (Refer to Section 23 05 00):
 - 1. Spirotherm
 - 2. Taco Series 4900 - AD
 - 3. Wessels Wess – Vent
 - 4. Armstrong DAS
- B. Construction and design:
 - 1. In-line design, 150 psi working pressure
 - 2. ASME SEC 8-D construction
 - 3. Brass construction for sizes 1½ inches and smaller
 - 4. Steel construction for sizes 2 inches and larger
 - 5. Turbulence suppressive type air eliminator to separate micro bubbles and to remove stationary air pockets through absorption
 - 6. Copper or stainless steel coalescing medium
 - 7. Integral brass venting mechanism at top of unit
 - 8. Side valve to remove floating liquids and debris from the surface
 - 9. Threaded blowdown connection port at bottom
 - 10. Sized for maximum water velocity of 4 fps and maximum pressure drop of 1.5 feet WG.

2.2 AIR VENTS

- A. Manufacturers (Refer to Section 23 05 00):
 - 1. Bell and Gosset
 - 2. Hoffman
 - 3. Spirotherm
 - 4. Taco
 - 5. Caleffi
 - 6. Nexus
- B. Manual Type:
 - 1. Basis of Design: Bell and Gossett, No. 4V

2. 1/8 inch coin or screwdriver operated, brass connection
- C. Automatic Type:
 1. Basis of design: Bell and Gossett, No. 87
 2. Brass or semi-steel body, copper float, stainless steel valve and valve seat; suitable for system operating temperature and pressure (150 psi at 240 °F minimum); with isolating valve
 3. Air vent shall be tapped for 1/8 inch IPS.
- D. Automatic Type: High Capacity
 1. Basis of design: Bell and Gossett, No. 107A
 2. Non-modulating high capacity air vent design to purge free air from the system and provide positive shutoff at pressures up to 150 psig at a maximum temperature of 250 °F. The design of the high capacity air vent shall prevent air from entering the system if system pressure should drop below atmospheric pressure. The high capacity air vent shall be pilot operated for intermittent purging of free air at pressures up to 2 psig during normal system operation, and diaphragm operated for full capacity purging of free air at pressures between 2 to 150 psig.
- E. Manual Type: High Capacity
 1. Short vertical sections of 2 inches diameter pipe to form air chamber, with 1/8 inch brass needle valve at top of chamber

2.3 BALANCING COCKS

- A. Balancing cocks where indicated shall be ball or butterfly valves as specified in Section 23 05 23.

2.4 COIL PIPING PACKAGES

- A. Manufacturers (Refer to Section 23 05 00):
 1. As listed under flow balancing valve sections (for manual or automatic flow balancing valves).
- B. Automatic flow control valves as specified in this section; flow control valves shall be complete with ball valve, flow control, two pressure/temperature test ports.
- C. Combination strainer and ball valve shall be complete with blow-down strainer, one pressure/temperature test port and ground joint union for field exchange of internal components. Unit shall be all brass and stainless steel.
- D. Valves and strainers shall be marked externally with size, capacity and direction of flow.
- E. Hoses
 1. All hoses shall be equipped with swivel end connections at terminal unit. All end connections shall be crimped to meet stated pressure ratings. Serrated/slip fit connections are not acceptable.
 2. Flame Retardant Hoses. Hose materials shall be stainless steel braided over an EPDM liner. Hoses shall meet or exceed the ASTM-D380-83 standard and withstand working pressures of 1/2": 300 PSI, 3/4": 250 PSI, 1"-1-1/4": 210 PSI, 1-1/2": 188 PSI, @ 200°F; Burst Pressure: 1/2": 1500 PSI, 3/4": 1200 PSI, 1", 900 PSI, 1-1/4": 750 PSI, 1-1/2" – 2": 500 PSI.
 3. Hoses shall meet or exceed flame retardant testing per standards UL #723, NEPA #225, ANSI 2.5, UBC 42-1, and ASTM-E84A. after ten minutes and produce less than 5% smoke as compared to Red Oak flooring (100%)

2.5 EXPANSION TANKS

- A. Manufacturers (Refer to Section 23 05 00):
 - 1. Amtrol
 - 2. Armstrong
 - 3. Bell and Gossett
 - 4. Taco
 - 5. Wessels
- B. Construction:
 - 1. Bladder Type: Welded steel; tested and stamped in accordance with ASME SEC 8-Div. 1; cleaned; prime coated; fitted with lifting rings and steel support saddle; tappings for installation of accessories; supplied with National Board Form U-1; 125 psi pressure rating; field-replaceable heavy duty butyl rubber bladder; air charging valve (standard tire valve); tank drain
 - 2. Tank shall be full or partial acceptance as scheduled.
- C. Accessories:
 - 1. Manual air vent
 - 2. Pressure relief valve: Select for pressures noted on the drawings.
 - 3. Water pressure gauge: Install at system connection.
 - 4. Air pressure gauge: charging valve indicated above shall be independent of gauge, and shall be accessible without removal of gauge.

2.6 FLOW BALANCING VALVES (AUTOMATIC)

- A. Manufacturers (Refer to Section 23 05 00):
 - 1. IMI Flow Design/Autoflow
 - 2. Griswold
 - 3. Nexus
- B. Basis of Design: Autoflow Series YR
- C. General: Pressure compensating; factory set to control within 5 % of selected rating at pressure differential of ten (10) times the minimum required full flow conditions. Valves shall be complete with flow control, two pressure/temperature test ports and ground joint union to allow field exchange of internal components without removing from pipeline. Unit shall be all brass and stainless steel.
- D. Valves shall be marked externally with size, capacity and direction of flow.

2.7 SAFETY RELIEF VALVES

- A. Manufacturers (Refer to Section 23 05 00):
 - 1. Bell and Gossett
 - 2. Taco
- B. Basis of Design:
 - 1. Bell and Gossett Series 790 and 1170
- C. Construction:
 - 1. Body: Brass
 - 2. Diaphragm and Seat: EPDM
 - 3. Internal Wetted Parts: Brass

4. ASME labeled, diaphragm assisted
5. Maximum Working pressure 125 psig
6. Maximum operating temperature 250 F
7. Relief setting: As indicated on drawings

2.8 STRAINERS

- A. Manufacturers (Refer to Section 23 05 00):
 1. Sarco
 2. Strong, Dunham Busch
 3. Webster
 4. Watson McDaniel
 5. Nexus
- B. Size 2 inch and under:
 1. Basis of Design: Sarco IT, BT
 2. Screwed brass or iron body for 250 psig working pressure Y pattern with 1/32 inch stainless steel perforated screen
 3. Accessories: 3/4 inch blow-off valve and cap
- C. Size 2½ inch to 8 inch:
 1. Basis of Design: Sarco CI-125
 2. Flanged iron body for 147 psig working pressure; Y pattern with 3/64 inch stainless steel perforated screen
 3. Accessories: 3/4 inch blow-off valve and cap

2.9 VENTURIS

- A. Manufacturers (Refer to Section 23 05 00):
 1. Barco
 2. Hyspan
 3. HCl
 4. Nexus
 5. Griswold
- B. Precision machined orifice with tag indicating size and flow ratings. Fittings shall have two meter taps, each with shut-off cock and thread protector.

2.10 PUMP SUCTION FITTINGS

- A. Provided under Section 23 21 23.

2.11 GLYCOL FILL ASSEMBLY

- A. Provided under Section 23 25 00.

PART 3 EXECUTION

3.1 INSTALLATION

- A. General:

1. Provide specialties in accordance with manufacturer's instructions and as indicated on the drawings.
 2. Where large air quantities can accumulate, provide enlarged air collection standpipes.
- B. Air Separators:
1. Provide air separator on suction side of system circulation pump.
- C. Air Vents:
1. Provide automatic air vents at high points in mechanical rooms, at coils in mechanical rooms, and where indicated on the drawings. Provide isolation ball valve at each vent for future service of vent.
 2. Provide manual air vents other at system high points and as indicated.
 3. Provide high-capacity air vent at the air separator, as specified with the air separator, and pipe to overflow tank.
 4. Provide threaded ½ inch ball valve between high capacity and automatic air vents and line served. Pipe connection to be ½ inch minimum.
 5. Provide manual air vents on all water coils and at high points of piping systems. All air vents shall have a manual shutoff.
- D. Flow Control Balancing Valves:
1. Provide flow control balancing valves at all water coils, pumps, re-circ pump, pipe mains and equipment as indicated.
 - a. Install flow control balancing valves with meter connections upward.
 2. Valves shall be sized as noted in Part 2 Products. Provide concentric reducers on either side of valve when valve is smaller than line size.
- E. Relief Valves:
1. Provide relief valves on pressure tanks, low pressure side of reducing valves, heat exchangers, and expansion tanks.
 2. Select system relief valve capacity so that it is greater than make-up pressure reducing valve capacity. Select equipment relief valve capacity to exceed rating of connected equipment.
 3. Install relief valves without a vertical lift on the outlet piping.
 4. Pipe relief valve outlet to nearest floor drain for water systems or empty overflow tank for glycol systems.
 5. Where location of glycol feeder will not allow relief piping to be installed without a vertical lift, provide a chemical drum adjacent to relief valve and pipe relief valve to the drum.
 6. Where one line vents several relief valves, make cross sectional area equal to sum of individual vent areas. Connections from the outlet to the manifold piping shall enter the manifold at an angle no greater than 45 degrees to the direction of flow.
- F. Strainers:
1. Provide ¾ inch valved drain and hose connection on strainer blow down connection.
 2. Provide strainer upstream of all control valves, coils, reducing valves, traps and other devices with orifices.
- G. Venturis:
1. Install venturi flow devices with required straight lengths of piping upstream and downstream of valve according to the manufacturer's recommendations.

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. In-Line Circulating Pumps

1.2 RELATED SECTIONS

- A. Division 3 – Cast-in-Place Concrete
- B. Section 23 05 00 – Common Work Results for HVAC
- C. Section 23 05 13 – Common Motor Requirements for HVAC Equipment
- D. Section 23 05 19 – Meters and Gauges for HVAC Piping
- E. Section 23 05 23 – General Duty Valves for HVAC Piping
- F. Section 23 05 48 – Vibration Controls for HVAC
- G. Section 23 05 93 – Testing, Adjusting, and Balancing
- H. Section 23 07 00 – HVAC Insulation
- I. Section 23 09 95 – Variable Frequency Drives
- J. Section 23 21 13 – Hydronic Piping
- K. Section 23 21 16 – Hydronic Piping Specialties
- L. Section 23 25 00 – HVAC Water Treatment

1.3 REFERENCES

- A. General
 - 1. UL 778 - Motor Operated Water Pumps
 - 2. NFPA 70 - National Electrical Code

1.4 SUBMITTALS (REFER TO SECTION 23 05 00)

- A. General
 - 1. Construction: Verify each component of the construction requirements of these specifications including casing, impeller, shaft, sleeve, ring, and seat materials. Indicate maximum continuous operating temperature and working pressures. Address requirements for suction and discharge tappings.
 - 2. Performance Information: Provide all information indicated in the equipment schedule for each pump as a minimum including shut-off head, efficiency, brake horsepower, motor horsepower, motor voltage, and motor phase. Impeller diameter shall also be indicated.
 - 3. Pump Curves: Provide certified pump curves for each pump with design flow and pressure plotted. Curves shall be provided on a chart with flow on the x-axis and pressure on the y-axis.

Brake horsepower lines shall also be indicated on the chart sufficient to determine the approximate brake horsepower at any given point on the curve. Include NPSH curve when applicable.

4. Accessories: Indicate all accessories to be provided with each pump.
- B. In-Line Circulating Pumps: Indicate lubrication and sealing of ball bearings. Provide manufacturer's installation instructions, including hanging and support recommendations.

1.5 OPERATION AND MAINTENANCE DATA (REFER TO SECTION 23 05 00)

- A. Include the following minimum information: All pump performance and pump curve information required for equipment submittals; installation instructions; assembly views; replacement parts; and lubrication instructions including lubrication points, type of lubrication to be provided, and frequency of lubrication.

1.6 REGULATORY REQUIREMENTS

- A. Products Requiring Electrical Connection: Listed and classified by UL as suitable for the purpose specified and indicated.
- B. Electrical connection points (lugs) shall be UL listed for use with both copper and aluminum wiring.

1.7 EFFICIENCY STANDARDS

- A. Pumps that require a 15 % or greater increase in brake horsepower than the scheduled equipment to meet the design flow and pressure requirements will not be considered equal and will not be accepted.

1.8 EXTRA MATERIALS (REFER TO SECTION 23 05 00)

- A. Provide one (1) spare set of mechanical seals for each pump.

1.9 DRAWING SCHEDULES

- A. Refer to drawings for specific capacities, dimensions, accessories, and other requirements supplemental to these specifications.

PART 2 PRODUCTS

2.1 BASE MOUNTED SPLIT COUPLED VERTICAL IN-LINE PUMPS

- A. Manufacturer (refer to Section 23 05 00)
 1. Armstrong Series 4300
 2. Taco KS Series
 3. Bell and Gossett
- B. Pumps shall be a split coupled vertical inline centrifugal pumping unit. The pumps shall be radially split, single stage centrifugal type with bronze fitted casing with equal size suction and discharge flanges and have separate tapped lower carbon throttle bushing. Outside balanced type mechanical seal with carbon rotating face, ceramic stationary seat and viton secondary seal. Pump casing shall have a rated working pressure of 175 psi at 250 degrees F.

- C. Pumps shall be furnished with replaceable bronze wear rings. The pumps shall have a factory installed vent/flush line to insure removal of trapped air and mechanical seal cooling. The vent/flush line shall run from the seal chamber to the pump discharge
- D. Pump shall incorporate an outside balanced mechanical seal, which allows for its removal without disturbing the pump or motor connections. Rigid spacer coupling shall be constructed of high tensile aluminum alloy.
- E. Pump casing shall have suction and discharge gauge tapings. Provide pressure/temperature test ports adjacent to all gauge tapings.
- F. Pump Suction Fitting: Angle pattern; cast iron body; inlet vanes; cylinder strainer with 3/16 inch diameter openings; disposable fine-mesh strainer over cylinder strainer; magnetic insert removable for cleaning; adjustable support foot.
 - 1. Exception: Pump suction fittings that do not have an integral support foot shall be provided with an adjustable pipe stand

2.2 VFD CONTROLLED PUMPS

- A. All VFD controlled pumps (see VFD schedules on drawings) shall be provided with shaft grounding rings.

PART 3 EXECUTION

3.1 PREPARATION

- A. Verify that electrical power is available and of the correct characteristics.

3.2 GENERAL

- A. Provide pumps in accordance with manufacturer's instructions and as indicated.
- B. Coordinate with Division 26 to ensure pumps are installed with sealproof electrical cord with 24" service loop to facilitate maintenance.
- C. Provide access space around pumps for service. Provide no less than minimum as recommended by manufacturer.
- D. When pump connections are smaller than piping line-size, decrease from line size with long radius reducing elbows or reducers. Pipe-size reduction shall occur near the pump connection, with all valving associated with the pump being of piping line-size.
- E. Support piping adjacent to pump such that no weight is carried on pump casings.
- F. Provide air cock and drain connection on horizontal pump casings.
- G. Lubricate pumps before start-up.
- H. Provide single pressure gauge at each pump with isolation gauges to isolate total, suction and discharge pressures. See Section 23 05 19.

3.3 BASE MOUNTED CIRCULATING PUMPS

- A. Provide supports under elbows on pump suction and discharge line for pipes size 4 inch and over. Refer to Section 23 05 48.
- B. Provide line-size shut-off valve and pump suction fitting on pump suction. Provide separate line-size shut-off valve (and non-slam check valve where indicated) on pump discharge.
- C. Manufacturer's representative shall check, align, and certify alignment of base mounted pumps prior to start-up and provide start-up services. Measure vibration on pumps to insure it is within limits of Section 23 05 48 and the manufacturer requirements. Submit start-up reports to the Owner's representative.
- D. Install on concrete housekeeping base with anchor bolts. Set and level, and grout in place. Refer to Division 03.
 - 1. Exception: Pumps shown on drawings to be mounted on inertia bases. Refer to Section 23 05 48.
- E. Connect piping to pump with neoprene flexible pipe connectors. See Section 23 05 48.

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Cleaning of piping systems
- B. Chemical feeder equipment
- C. Chemical treatment
- D. Equipment, valves, controls, and connections to systems
- E. Electrical wiring of components to source unless indicated otherwise

1.2 RELATED SECTIONS

- A. Section 23 05 00 – Common Work Results for HVAC
- B. Section 23 09 23 – Direct-Digital Control for HVAC
- C. Section 23 52 16 – Condensing Boilers
- D. Section 23 64 00 – Packaged Water Chillers (Air Cooled)

1.3 REFERENCES

- A. NFPA 70 - National Electrical Code

1.4 SUBMITTALS

- A. Submit under provisions of Section 23 05 00.
- B. Shop Drawings: Indicate system schematic, equipment locations, controls schematics, electrical characteristics, and connection requirements.
- C. Product Data: Provide chemical treatment materials, chemicals, and equipment including electrical characteristics and connection requirements.
- D. Cleaning and flushing plan.
- E. Manufacturer's Field Reports (Refer to Section 23 05 00):
 - 1. Indicate analysis of existing systems prior to making connections to new systems in accordance with Section 23 05 05.
 - 2. Indicate start-up of treatment systems when completed and operating properly.
 - 3. Indicate analysis of system water after cleaning and after treatment.

1.5 PROJECT RECORD DOCUMENTS (REFER TO SECTION 23 05 00)

- A. Record actual locations of equipment and piping, including sampling points and location of chemical injectors.

1.6 OPERATION AND MAINTENANCE DATA (REFER TO SECTION 23 05 00)

- A. Operation and Maintenance Data: Include data on chemical feed pumps, and other equipment including spare parts lists, procedures, and treatment programs. Include step by step instructions on test procedures including target concentrations. Include the volume of each system.

1.7 QUALIFICATIONS

- A. Manufacturers-Chemicals: Company specializing in manufacturing the products specified in this section with minimum five (5) years documented experience. Company shall have local representatives with State Certified Laboratories and full-time service personnel in the area of the job site.
- B. Installer: Company specializing in performing the work of this section with minimum five (5) years documented experience and who is approved by manufacturer.

1.8 QUALITY ASSURANCE

- A. Start-up, system check, water samples, analysis, cleaning, flushing, and testing shall be performed by a single water treatment company for undivided responsibility.
- B. Company shall only utilize qualified personnel active in the field of water treatment who are factory trained or authorized.
- C. Analysis, testing and reports shall be performed by a State Certified Lab.

1.9 REGULATORY REQUIREMENTS

- A. Conform to applicable code for addition of non-potable chemicals to building mechanical systems, and to public sewage systems.
- B. Products Requiring Electrical Connection: Listed and classified by UL as suitable for the purpose specified and indicated.

1.10 MAINTENANCE SERVICE

- A. Furnish service and maintenance of treatment systems for one (1) year from Date of Substantial Completion.
- B. Provide technical service visits to perform field inspections and make water analysis on site. Detail findings in writing on proper practices, chemical treating requirements, and corrective actions needed. Submit two copies of field service report to the Owner's representative after each visit.
- C. Schedule:
 - 1. Closed loop systems; a minimum of four visits per year on a quarterly basis.
- D. Provide laboratory and technical assistance services during this maintenance period.
- E. Include training course for operating personnel, instructing them on installation, care, maintenance, testing, and operation of water treatment systems in accordance with Section 23 05 00. Arrange course to occur at start-up of systems.

- F. Provide on-site inspections of equipment during scheduled or emergency shutdown to properly evaluate success of water treatment program and make recommendations in writing based upon these inspections.

1.11 MAINTENANCE MATERIALS

- A. Provide maintenance materials under provisions of 23 05 00.
- B. Provide sufficient chemicals for treatment and testing for one year from the date of substantial completion.

PART 2 PRODUCTS

2.1 MANUFACTURERS/INSTALLERS (REFER TO SECTION 23 05 00):

- A. Flint Services Inc.
- B. King Soft Water

2.2 MATERIALS

- A. System Cleaner:
 - 1. Manufacturers (Refer to Section 23 05 00):
 - a. Flint Services Inc., Product DetSol CW-LF
 - b. King Soft Water CW 425N
 - c. Nalco/Ecolab
 - 2. A phosphate wetting agent combined with an alkaline surfactant with a sodium carbonate type alkalinity supplement introduced as necessary to produce 600 ppm of phenolphthalein alkalinity. Chemicals shall be non-toxic.
- B. Closed System Treatment (Heating Hot Water, Chilled Water, Heat Reclaim, Condenser Water Closed System, and Snowmelt Water):
 - 1. Manufacturers (Refer to Section 23 05 00):
 - a. Flint Services Inc., Product CS-39
 - b. King Soft Water: CST-N25
 - c. Nalco
 - d. Betz
 - 2. Chemical properties:
 - a. Ferrous metal corrosion inhibitor product shall provide corrosion protection by the use of sodium molybdate, sodium nitrate, and sodium borate technique.
 - b. Non-ferrous metal corrosion inhibitor product shall provide corrosion protection by the use of tolytriazole.
 - c. System shall be treated with biocides to prohibit biological growth within the closed system.
 - d. Sequestering agent to reduce deposits and control PH.
- C. Freeze Protection
 - 1. Manufacturers (Refer to Section 23 05 00):
 - a. DowFrost HD
 - b. Interstate Chemical, Product P-300
 - 2. System shall be charged with an inhibited propylene glycol mixed with demineralized water.

2.3 BY-PASS (POT) FEEDER

- A. Manufacturers (Refer to Section 23 05 00):
 - 1. Flint Services Inc.
 - 2. A and F Machine Products
 - 3. JL Wingert
 - 4. Neptune
- B. Quick opening cap for working pressure of 175 psig. Sizes as scheduled below:
 - 1. System volume up to 200 gallons: 1 gallon pot feeder
 - 2. System volume greater than 200 gallons and less than 2000 gallons: 2 gallon pot feeder
 - 3. System volume greater than 2000 gallons: 5 gallon pot feeder

2.4 GLYCOL MAKE-UP FEEDER

- A. Manufacturers (Refer to Section 23 05 00):
 - 1. PalsaFeeder
 - 2. JL Wingert
 - 3. Advantage
 - 4. IATCS
 - 5. Wessels
 - 6. Axiom
- B. The glycol system shall have the following features with all components mounted on a welded steel stand.
 - 1. Tank (heating systems where reliefs are pumped back into the tank): 50 gallon carbon steel
 - 2. Tank (all other systems): 50 gallon polyethylene
 - 3. Pump: positive displacement
 - 4. Controller: NEMA 1 enclosure
 - 5. Electrical:
 - a. 120 volts, single phase, 60 Hz
 - b. Cord and Plug: Provide unit with 6 foot cord and plug for connection to electric wiring system including grounding connector.
 - c. Single point electrical connection
 - 6. Features:
 - a. Pressure switch factory set: 0-100 psig (field adjustable) Pump shut-off valves
 - b. Pump discharge check valve
 - c. Low water pump protection
 - d. Relief valve
 - e. Pressure gauges
 - f. Power light, pump light, alarm light
 - g. Drain valve
 - h. Removable tank cover
 - 7. Accessories
 - a. Dry contacts for low water level alarm to be monitored by the building temperature control system.
 - b. Dual pumps to feed two separate systems from the same tank change model to Palsafeeder GF-2.

2.5 GLYCOL RECOVERY TANK

- A. Provide empty spare tank for acceptance of glycol from safety relief valves, minimum 50 gallons, polyethylene, closed/removable top with minimum (2), 2" openings.

PART 3 EXECUTION

3.1 RENOVATIONS

- A. Scope of work includes cleaning flushing existing piping system, coils and equipment in addition to new work. Due to phasing, this may require duplication of flushing requirements to maintain water quality in the system. All required water treatment work, including but not limited to, cleaning and flushing, system fill, etc. shall be completed to allow occupancy upon completion of each phase of work. Upon completion of the final phase, the entirety of each hydronic system shall be cleaning and flushed, filled, chemically treated and new glycol added.
- B. Systems requiring glycol shall be charged with glycol at the completion of each phase. At the completion of subsequent phases, glycol installed in previous phases required to be drained shall be salvaged and reused. At the completion of the final phase, glycol installed during previous phases shall be disposed of and new glycol added to all systems requiring glycol to the levels specified.
- C. Existing system shall be flushed prior to the start of demolition and chemically treated. This shall occur prior to connection to new piping and pumps

3.2 PREPARATION

- A. Prior to water treatment being performed for closed loop systems the Division 23 and 23 09 23 contractors shall provide documentation that all control valves are connected and in operation and verify that all valves are in the open position for complete circulation of cleaning chemical. Performing a cleaning procedure with closed valves may result in contamination of system glycol solution. Documentation shall be provided at the end of each phase of work prior to commencement of the water treatment work.
- B. Systems shall be operational, filled, hydrostatically tested, started, and vented prior to cleaning. Use water meter to record capacity in each system. Record capacity and include in Operation and Maintenance Manuals.
- C. Mechanical Contractor shall make temporary piping connections, contractor providing work in this section shall furnish temporary pumps, and temporary bypass filter as required to properly accomplish all cleaning operations.
- D. Place all manual and control valves serving main coil banks and terminal control units in open position during cleaning so that circulation through the mains and the runouts is obtained during cleaning.
- E. Initially flush the system with cold water through temporary flushing and drain connection. Flushing shall be sufficient to remove all contaminants, such as cuttings, filings, lubricants, rust, scale, grease, solder, flux, welding residue and debris.
- F. Verify that electric power is available and of the correct characteristics.

- G. Prior to introduction of demineralized water to systems treated with glycol, show demineralization equipment being utilized for the project to the Owner's Representative to obtain sign-off from Owner's Representative and include with start-up reports.

3.3 CLEANING AND FLUSHING WORK PLAN

- A. The chemical treatment contractor shall develop a project specific work plan for cleaning and flushing. The treatment plan shall be coordinated with the piping contractor prior to submission to the Owner's representative.
- B. Work plan shall be submittal with chemical treatment products. Submittals that do not include a treatment plan will be rejected and returned to the contractor without review.
- C. The work plan shall include:
 - 1. Condition of existing systems per Section 23 05 00.
 - 2. Drawings indicating phasing and duration for input into the general contractors work schedule. Cleaning and flush for each phase shall be indicated on a set of piping plans with each phase of work clearly identified.
 - 3. Flushing schedule and drawings or diagrams that will be used for inspection and sign off prior to and after procedure, at Owner's option.
 - 4. Duration of flushing for each pipe system type
 - 5. Repeat flushing (if required to due to phasing).
 - 6. Specific procedures used for cleaning and flushing.
 - 7. Flushing velocities and flow rates with calculations, drawings and diagrams showing sectioning or zoning of piping systems to achieve required velocities, locations and means of temporary bypasses and returns.
 - 8. Temporary piping connections, temporary pumps and temporary bypass filters. Temporary pump motor size and power source.
 - 9. Cleaning treatment products
 - 10. Post treatment chemicals
- D. Provide the CX agent with minimum two weeks notice in advance of each cleaning and flushing activity. Schedule activities during normal business hours as much as practical.

3.4 CLEANING SEQUENCE

- A. Piping Systems Requiring Cleaning
 - 1. All hydronic heating, cooling, steam and steam condensate piping systems require cleaning. The work also includes any existing piping to which the new system is connected or any sections of the existing distribution systems if those lines must be drained and left empty for more than 7 days.
- B. Documentation and Notification
 - 1. The contractor is to submit a list showing what chemicals are to be used and in what concentrations (MUST include data and instruction sheets on each chemical and their MSDS forms) for each system to be cleaned and treated, a minimum of two weeks prior to cleaning. 24 hours prior to cleaning, the Owner needs to be notified of the start of the cleaning process and its duration. Documented process and test results with certificates stating the date, time, system cleaned and treated and testing results.
- C. Final Acceptance

1. The cleaning and flushing must be complete, as well as Testing, Adjusting, and Balancing. If the balancer finds dirt, sludge, oil, cuttings, fittings, rust, scale or other such debris, the affected system is re-cleaned.
 2. Water quality report shall be provided to the Owner's Representative upon completion of cleaning.
- D. Concentration:
1. 1 pound per 100 gallons of water contained in the system.
 2. 1 pound per 100 gallons of water for heating hot water systems and for open loop condenser systems.
 3. 1 pound per 50 gallons of water for closed loop condenser water systems, chilled water and heat reclaim water systems.
- E. Hot Water Heating Systems:
1. Completely fill the system with cleaning solution and circulate throughout the system to assure a rapid, efficient clean-up of all suspended solids and foreign material present in the system.
 2. Apply heat while circulating, slowly raising temperature to 160 °F and maintain for twelve (12) hours minimum.
 3. Remove heat and circulate to 100 °F or less; drain systems as quickly as possible and refill with clean water.
 4. Circulate for 6 hours at design temperatures, then completely drain the system.
 5. Refill with clean water and flush via the flushing and draining connections for a minimum one (1) hour duration.
 6. Maintaining a full system and continuing the fresh water flush, operate the circulating pump, partially close and reopen all manual valve several times, operate all automatic control valves through several cycles and continue this operation until no further traces of cleaning compound are detected and until there is no evidence of particulate matter in the system.
 7. Drain the system. Clean all strainers. After cleaning strainers and removal of start-up strainers, refill the system with clean water, circulate for thirty (30) minutes and drain system. Following the final flushing operation, fill the piping with fresh water.
 8. Valve off coils, remove strainer for cleaning. Open supply isolation valve and drain until clear, then close supply valve. Open return isolation valve and drain until clear, then close return valve. Replace strainer and open isolation valves.
- F. Chilled Water Systems:
1. Completely fill the system with cleaning solution and circulate throughout the system to assure a rapid, efficient clean-up of all suspended solids and foreign material present in the system.
 2. Circulate for twenty-four (24) hours, then drain systems as quickly as possible.
 3. Refill with clean water and flush via the flushing and draining connections for a minimum one (1) hour duration.
 4. Maintaining a full system and continuing the fresh water flush, operate the circulating pump, partially close and reopen all manual valve several times, operate all automatic control valves through several cycles and continue this operation until no further traces of cleaning compound are detected and until there is no evidence of particulate matter in the system.
 5. Drain the system. Clean all strainers. After cleaning strainers and removal of start-up strainers, refill the system with clean water, circulate for thirty (30) minutes and drain system. Following the final flushing operation, fill the piping with fresh water.
 6. Valve off coils, remove strainer for cleaning. Open supply isolation valve and drain until clear, then close supply valve. Open return isolation valve and drain until clear, then close return valve. Replace strainer and open isolation valves.

- G. Boilers
 - 1. Boilers shall be boiled out prior to flushing piping systems in accordance with the boiler manufacturer's requirements using a formula consisting of an alkalinity supplement, dispersants and a phosphate compound such as Tri-Sodium Phosphate. This solution shall be introduced into the system at a rate sufficient to procure phenolphthalein alkalinity test result of 600 PPM. The solution should then be circulated for a minimum of four hours duration and should be thoroughly drained and flushed. See boiler specifications for additional requirements.
- H. Use neutralizer agents on recommendation of system cleaner supplier and approval of Architect/Engineer.
- I. Inspect, remove sludge, and flush low points with clean water after cleaning process is completed. Include disassembly of components as required.
- J. Add specified treatment chemicals as soon as possible after cleaning and flushing. Treatment chemicals must be added within two (2) hours of filling system with clean water.
- K. The cleaning firm shall, upon completion of cleaning and chemical treatment addition, tag each system so that tag is plainly visible as follows: "THIS SYSTEM HAS BEEN CHEMICALLY CLEANED AND TREATED". Each strainer shall additionally be tagged indicating strainer has been cleaned and date of cleaning.

3.5 INSTALLATION

- A. Furnish and install all devices as specified in this section and indicate on the drawings in accordance with manufacturer's instructions.
- B. All piping and wiring for chemical treatment shall be provided under this section unless indicated otherwise on the drawings.
- C. Systems shall be complete and shall be installed in strict accordance with the manufacturer's diagrams and recommendations, including all piping and electrical work.
- D. The manufacturer's representative shall be responsible for assisting the contractor during construction and shall charge the systems.
- E. Extension of existing systems: Refer to Section 23 05 05.

3.6 CLOSED SYSTEM TREATMENT

- A. Provide bypass pot feeder for each system when indicated on the drawings. Install isolating and drain valves and necessary piping. Pipe bypass feeder drain valve to the nearest floor drain. Install with the inlet of the feeder connected to the discharge side of the pump and the outlet of the feeder connected to the suction side of the pump.
- B. Introduce closed system treatment through bypass feeder (or glycol make-up feeder) when required or indicated by test.
- C. Freeze Protection:
 - 1. Introduce inhibited glycol solution through the glycol make-up feeder. In phased construction, new glycol shall be provided for the building at the completion of the initial phase and again at the completion of the final phase, reuse of existing glycol mixture is not allowed.

2. Introduce inhibited glycol from a solution tank through a solution metering pump as indicated by the system pressure switch. Install as detailed on the drawings.
3. Charge the following systems to the volume glycol concentrations indicated:
 - a. Heating Hot Water 0%
 - b. Chilled Water 30%
4. Provide high temperature, corrosion resistant glycol recovery tank for each glycol system in mechanical room for acceptance of glycol solution from safety relief valves and air vents.
5. Install per manufacturer's recommendations adhering to compatible make-up water and inhibitor requirements.

3.7 SUPPLEMENTAL REQUIREMENTS

- A. At project closeout, installer shall be represented at final observation meeting by qualified personnel with equipment and two (2) copies of start-up reports.
 1. Owner's Representative may choose and direct spot checking of system cleaning via strainer removal & blow-down. Systems not observed to be cleaned shall be re-drained, cleaned and flushed with appropriate chemicals re-introduced into system. This shall occur at no additional cost to the Owner.

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. General Materials
- B. Low velocity ductwork and fittings
- C. Medium velocity ductwork and fittings

1.2 RELATED SECTIONS

- A. Section 23 05 00 – Common Work Results for HVAC
- B. Section 23 05 29 – Hangers and Supports for HVAC Piping and Fittings
- C. Section 23 33 00 – Air Duct Accessories
- D. Section 23 36 00 – Air Terminal Units

1.3 REFERENCES

- A. ASTM A 36 - Structural Steel
- B. ASTM A 90 - Weight of Coating on Zinc-Coated (Galvanized) Iron or Steel Articles
- C. ASTM A 167 - Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip
- D. ASTM A 366 - Steel, Sheet, Carbon, Cold Rolled, Commercial Quality
- E. ASTM A 525 - General Requirements for Steel Sheet, Zinc- Coated (Galvanized) by the Hot-Dip Process
- F. ASTM A 527 - Steel Sheet, Zinc-Coated (Galvanized) by Hot-Dip Process, Lock Forming Quality
- G. ASTM B209 - Aluminum and Aluminum-Alloy Sheet and Plate
- H. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Material
- I. NFPA 90A - Installation of Air Conditioning and Ventilating systems
- J. SMACNA - HVAC Air Duct Leakage Test Manual
- K. SMACNA - HVAC Duct Construction Standards - Metal and Flexible
- L. UL 181 - Factory-Made Air Ducts and Connectors

1.4 PERFORMANCE REQUIREMENTS

- A. Drawings showing duct arrangements are diagrammatic only and do not attempt to show all offsets and fittings required. The contractor shall adjust the work as required to facilitate installation, COORDINATE WITH STRUCTURE AND OTHER TRADES. See Section 23 05 00, - "Locations".
- B. If changes of duct configuration or sizes are required to facilitate installation, obtain written permission from Owner's Representative before proceeding with fabrication and installation.

1.5 SUBMITTALS FOR REVIEW (REFER TO SECTION 23 05 00)

- A. Test Reports: Indicate pressure tests performed. Include date, section tested, test pressure, and leakage rate, following SMACNA HVAC Air Duct Leakage Test Manual. Furnish for O&M Manual.
- B. Submit manufactured medium pressure ductwork and fittings.

1.6 PROJECT RECORD DOCUMENTS (REFER TO SECTION 23 05 00)

- A. Record actual locations of ducts and duct fittings. Record changes in fitting location and type. Show additional fittings used.

1.7 QUALITY ASSURANCE

- A. Perform Work in accordance with SMACNA - HVAC Duct Construction Standards - Metal and Flexible. - Latest Edition.
- B. Maintain one copy of document on site.

1.8 REGULATORY REQUIREMENTS

- A. Construct ductwork to the International Mechanical Code, and SMACNA, HVAC Duct Construction Standards - Metal and Flexible, Latest Edition
- B. Where more than one standard is referenced, the most restrictive shall apply.

1.9 ENVIRONMENTAL REQUIREMENTS

- A. Do not install duct sealants when temperatures are less than those recommended by sealant manufacturers.
- B. Maintain temperatures during and after installation of duct sealants.

1.10 WARRANTY:

- A. Manufacturer must provide a 20 Year Product Warranty for products supplied for the fabric portion of this system as well as a Design and Performance Warranty.

1.11 DELIVERY, STORAGE AND HANDLING:

- A. Where possible, store products inside and protect from weather. Where necessary to store outside, store above grade and enclose with a vented waterproof wrapping.

- B. Protect textile air dispersion system (fabric duct) and Hoops (IHS) components from damage during shipping, storage, and handling.
- C. Ductwork shall be protected and handled in accordance with SMACNA Intermediate Level of duct cleanliness for new construction. See section 23 05 00 for additional requirements.

PART 2 PRODUCTS

2.1 GENERAL MATERIALS

- A. Galvanized Steel Ducts: ASTM A525 and ASTM A527 galvanized steel sheet, lock-forming quality, having G60 zinc coating in conformance with ASTM A90.
- B. Steel Ducts: ASTM A366.
- C. Sealants for metal ductwork:
 - 1. Sealant Class A, B and C: Hardcast, Duradyne, Ductmate, or approved equal.
 - 2. Exterior Systems:
 - a. Hardcast Inc. DT-Tape and RTA-50 adhesive two-part sealing system, or Hardcast Inc. Aluma-Grip 701 pressure sensitive rolled sealant tape.
 - 3. Non-hardening, water resistant, fire resistive, compatible with mating materials.
 - 4. Sealant shall be compositely tested for fire and smoke hazard ratings according to recognized standard testing methods (ASTM E84) and shall have ratings not exceeding flame spread 25, fuel contributed 50 and smoke developed 50.
 - 5. Sealants used on all non-exterior ductwork shall be water based (no solvents)
- D. Hanger Rod: ASTM A36; galvanized steel; threaded both ends, threaded one end, or continuously threaded.

2.2 LOW VELOCITY DUCTWORK AND FITTINGS

- A. Low velocity ductwork shall be defined as all ductwork not specifically defined as medium velocity ductwork.
- B. Fabricate, install, and support in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, the International Mechanical Code, and as indicated. Provide duct material, gauges, reinforcing, and sealing for operating pressures indicated.
- C. Construct T's, bends, and elbows with radius of not less than 1½ times width of duct on centerline. Provide turning vanes in all rectangular elbows greater than 45 degrees (unless utilized for return duct stub-outs into return air plenums - no vanes required).
- D. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.
- E. Where flat oval or k27 ductwork is indicated on the floor plans, ductwork shall be as defined and constructed to the requirements of medium velocity ductwork and fittings.
- F. Low velocity plenums
 - 1. Plenums shall be at least two (2) gauges heavier than specified ductwork of equal size.

2. Provide access doors to service equipment. Fabricate with 16 gauge steel double wall construction with 1 inch thick fiberglass insulation in core. Openings shall be reinforced with welded angle bar frames. Doors shall be pulled airtight on neoprene gaskets.

2.3 MEDIUM VELOCITY DUCTWORK AND FITTINGS

- A. Medium velocity ductwork shall be defined as all ductwork between the air handling equipment and the terminal supply, return, or exhaust boxes.
- B. Fabricate, install, and support in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, the International Mechanical Code, and as indicated. Provide duct material, gauges, reinforcing, and sealing for operating pressures.
- C. Round and Flat Oval Ductwork
 1. Manufacturers (Refer to Section 23 05 00):
 - a. United McGill Corp., Model Uni-Seal (un-lined)
 - b. United McGill Corp., Model K-27 (lined with insulation)
 - c. Ventline
 - d. Metco
 - e. Apollo Inc.
 - f. L&R Fabrication
 - g. SMK Inc.
 2. Spiral lockseam construction (no standing ribs)
 3. Fittings shall be all welded, or fully lapped and sealed spot welded, construction with machine formed entrances to branch fittings. All welding of fittings shall be of the continuous seam fusion type. All welded seams shall be covered with one coat of rust inhibiting paint, Rust-Oleum or approved equal, applied to both interior and exterior of duct or fittings.
 4. Centerline radius of elbows shall be 1.5 times the cross section diameter unless the drawings indicate a mitered 90 degree elbow with vanes. Elbows shall be constructed with five pieces for turns greater than 60 degrees, three pieces for turns between 60 degrees and 30 degrees, and two (2) pieces for turns 30 degrees and less.
 5. Round ducts:

Duct Size inches	U.S. Duct Gauge
Up to 8	26
9 to 14	26
15 to 26	24
27 to 36	22
37 to 50	20
Over 51	18

Fitting Size inches	U.S. Duct Gauge
Up to 26	22
27 to 50	20
52 to 60	18

6. Fittings shall be equal to United McGill Corp. as follows:
 - a. Elbows: SRHE5-90, SRHE3-60, SRHE3-45, SRHE2-30
 - b. Tees: SRHTC, SRHTCR, SRHTXC, SRHTXCR
 - c. Laterals: SRHLC, SRHLCR
 - d. Concentric reducer: SRHR

- e. Eccentric reducer: SRHRE
- 7. Joints in ducts and fittings up to and including 36 inch in diameter shall be made with couplings (2 inch insertion depth with stophead). Larger ducts and fittings shall be joined with companion flanges. Couplings and flanges shall be supplied by the duct manufacturer.

PART 3 EXECUTION

3.1 INSTALLATION-GENERAL

- A. Provide in accordance with manufacturer's instructions and as indicated on the drawings.
- B. Install and seal ducts in accordance with Washington State Energy Code and SMACNA HVAC Duct Construction Standards - Metal and Flexible and as specified for the specified pressure class and sealant class.
- C. Duct Sizes are gross outside dimensions. Where ductwork is indicated on the drawings to be lined, an allowance for 1 inch insulation has been included and duct sizes do not need to be increased to compensate for the insulation. Note: Internally insulated ductwork incorporating 2 inches of internal lining has been utilized in selected locations as noted on the drawings (duct sizes do not need to be increased to compensate for the 2 inch insulation).
- D. Provide openings in ductwork where required to accommodate thermometers and controllers. Provide pilot tube openings where required for testing of systems, complete with metal can with spring device or screw to ensure against air leakage. Where openings are provided in insulated ductwork, install insulation material inside a metal ring.
- E. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.
- F. Use crimp joints with or without bead for joining round duct sizes 8 inches and smaller with crimp in direction of air flow.
- G. Use double nuts and lock washers on threaded rod supports.
- H. Low velocity plenums:
 - 1. Construct with angle iron framing suitably reinforced to prevent sagging, breathing or vibration. The building structure shall not be used as walls or ceilings or plenums unless specifically indicated. All portions of the plenums shall be ½ inch minimum clearance from building structure.
 - 2. Where plenums are indicated to be fastened to the building floor, plenum construction shall be angle iron frame bolted to the floor with caulking compound applied before tightening.
 - 3. When plenums are not indicated to be set on the floor, the bottom of the plenum shall have additional angle iron bracing than required by ducts of the same size. Connect air inlets and outlets to low pressure ducts with 5 feet maximum length of flexible duct held in place with strap or clamp.
- I. Connect flexible ducts to metal ducts with duct sealer and secured over sheet metal collar with ½ inch wide positive locking strap. Flexible duct is not allowed on smoke control systems
- J. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.

- K. Internal surfaces of the uninsulated ductwork shall be wiped to remove excess dust immediately prior to installation, in accordance with SMACNA Intermediate Level of duct cleanliness for new construction.
- L. Make required offsets and transitions in ductwork in accordance with Section 23 05 00 ("Locations") and this section. Offsets shall be the least angle possible. Changes shall be submitted to the Owner's representative in shop drawing form before proceeding with the work so that the effects of offsets on system performance can be evaluated.

3.2 INSTALLATION-MEDIUM VELOCITY DUCTWORK

- A. Bullhead and straight tees will not be permitted.

3.3 CLEANING

- A. Ducts which accumulate dust and debris during construction shall be cleaned by the Contractor at no expense to the Owner.
 - 1. Clean duct system and force air at high velocity through duct to remove accumulated dust. To obtain sufficient air, clean half the system at a time. Protect equipment which may be harmed by excessive dirt with temporary filters, or bypass during cleaning.
 - 2. Ductwork which does not become clean by the above method shall be cleaned with high power vacuum machines. Protect equipment which may be harmed by excessive dirt with filters, or bypass during cleaning. Provide adequate access into ductwork for cleaning purposes.

3.4 SCHEDULES

- A. Provide duct materials in accordance with schedule below.
- B. Apply sealants to all ductwork in accordance with the schedule.
- C. Ductwork Material and Pressure Class Schedule

Air System	Pressure Class inches WG	Material
Low Velocity	2 Positive or Negative	Galvanized Steel
Medium Velocity	6 Positive or Negative	Galvanized Steel

- D. Sealants - Metal Ductwork
 - 1. Seal ductwork in accordance with table below.
 - 2. Openings for rotating shafts shall be sealed with bushings or other devices that seal off air leakage.
 - 3. Pressure sensitive tape is not an approved sealing method.
 - 4. All connections shall additionally be sealed, including but not limited to spin-ins, taps, other branch connections, access doors, access panels and duct connections to equipment.
 - 5. Sealants that would void the product listings is not required.
 - 6. Spiral lock seams need not be sealed except at transverse joints and fittings.
 - 7. Fittings and joints that are continuously welded ductwork do not require sealant.

Pressure Class inches WG	Sealant Class	Description
Up to 2	Class C	Seal all transverse joints and longitudinal seams with Class C sealant.

Pressure Class inches WG	Sealant Class	Description
3	Class B	Seal all transverse joints and longitudinal seams with Class B sealant.
4 and Greater	Class A	Seal all transverse joints, longitudinal seams, and ductwall penetrations with Class A sealant.

3.5 FIELD QUALITY CONTROL

A. Testing (Refer to Section 23 05 00)

1. Duct systems constructed to pressure classes 3 inches (positive or negative) WG and under (low velocity) shall be tested as follows.
 - a. Supply ductwork downstream of terminal boxes: Test a minimum of two representative terminal units and pressurize to 2 inches WG with a maximum allowable leakage of 3% of the terminal unit capacity measured by a calibrated orifice type flow meter. Additional testing of terminal box low pressure supply ductwork will not be required if visual inspection indicates sealing to level equivalent in quality to the representative test section.
 - b. Other Systems: the low pressure supply ductwork, return air, relief air, exhaust air and outside air ductwork systems shall be sealed and leakage tested so that the leakage rate at the design pressure does not exceed 6 percent of the fan flow. Leakage rate shall be determined by field verification and diagnostic testing, in accordance with SMACNA Duct Leakage Test Procedures, current edition.
 - 1) Exceptions: Outdoor ductwork for projects designed to LEED standards shall be leak tested in accordance with the requirements of leak tests for systems constructed to pressure classes greater than 3".
2. Provide leakage tests in accordance with the methods below for duct systems constructed to pressure classes greater than 3 inches (positive or negative) WG and all outdoor duct systems for projects designed to LEED Standards. Consult division 1 specifications to determine if LEED applies. Allowed air leakage (CFM) shall be less than the values calculated by both of the two following methods:
 - a. Method 1:
 - 1) Testing shall be in accordance with SMACNA HVAC Air Duct Leakage Test Manual and shown to have a rate of air leakage (CL) less than or equal to 4.0 as determined in accordance with the equation: $CL = F/P^{0.65}$, where:
 - a) F = The measured leakage rate in cfm per 100 square feet of duct surface
 - b) P = The static pressure of the test.
 - b. Method 2:
 - 1) 3 % of the entire air handling capacity of the system.
 - c. Provide documentation demonstrating that representative sections totaling at least 100% percent of the total duct area have been tested and that all tested sections meet the requirements of both leakage methods above.
 - d. Minimum test pressure shall be 3.0 inches W.G.
 - e. Air leakage shall be measured by a calibrated orifice type flow meter.
3. Perform tests in the presence of the Owner's Designated Representative. Owner's Representative shall sign test reports as witness. When each system is complete, submit to the Owner's representative for review and approval. Submit final reports for inclusion in O&M Manual.

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Air turning devices
- B. Duct test holes

1.2 RELATED SECTIONS

- A. Section 23 05 00 – Common Work Results for HVAC
- B. Section 23 05 48 – Vibration Controls for HVAC
- C. Section 23 09 23 – Direct-Digital Control for HVAC
- D. Section 23 31 00 – HVAC Ducts and Casings
- E. Section 23 36 00 – Air Terminal Units

1.3 REFERENCES

- A. NFPA 90A - Installation of Air Conditioning and Ventilating Systems
- B. SMACNA - HVAC Duct Construction Standards - Metal and Flexible

1.4 SUBMITTALS FOR REVIEW

- A. Submit under provisions of Section 23 05 00. Include electrical characteristics and connection requirements.

1.5 PROJECT RECORD DOCUMENTS

- A. Submit under provisions of Section 23 05 00.

1.6 REGULATORY REQUIREMENTS

- A. Products Requiring Electrical Connection: Listed and classified by Underwriters' Laboratories Inc., as suitable for the purpose specified and indicated.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect and handle products to site under provisions of Section 23 05 00.

PART 2 PRODUCTS

2.1 AIR TURNING DEVICES

- A. Manufacturers (Refer to Section 23 05 00):

1. Duro Dyne
 2. Aero/Dyne
 3. Titus
 4. Tuttle and Bailey
 5. Krueger
 6. Pottorff
- B. Fabrication in accordance with SMACNA–HVAC Duct Construction Standard–Metal and Flexible suitable for duct pressure classification.
- C. Multi-blade device with single vane blades aligned in short dimension; with individually adjustable blades, mounting straps, galvanized steel, stainless steel or aluminum to match ductwork.
- D. Vanes installed in ductwork of unequal widths or angles shall have vanes shaped to project airflow parallel to duct sides.
- E. Air turns in medium velocity ductwork shall be high efficiency, double vane blades equal to H-E-P as manufactured by Aero/Dyne constructed with 2 inches long airfoil leading edge and a 3 inches long airflow trailing edge.
- F. Where specifically indicated on plans, acoustical air turns shall be equal to Sonoturn.

2.2 DUCT TEST HOLES

- A. Temporary Test Holes: Cut or drill in ducts as required. Cap with neat patches, neoprene plugs, threaded plugs, or threaded or twist-on metal caps.
- B. Permanent Test Holes: Factory fabricated, air tight flanged fittings with screw cap. Provide extended neck fittings to clear insulation.

PART 3 EXECUTION

3.1 PREPARATION

- A. Verify that electric power is available and of the correct characteristics.

3.2 INSTALLATION

- A. Provide accessories as indicated, in accordance with manufacturer's instructions, NFPA 90A, and follow SMACNA HVAC Duct Construction Standards - Metal and Flexible. Refer to Section 23 31 00 for duct construction and pressure class.
- B. Provide duct test holes where indicated and required for testing and balancing purposes.
- C. Provide air turning devices as specified in Section 23 33 00. Do not install in grease ducts or dryer exhaust. Not required in short return air transfer ducts which transfer air from a room to a ceiling plenum or from one room to another.

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Single Duct Terminal Units

1.2 RELATED SECTIONS

- A. Section 23 05 00 – Common Work Results for HVAC
- B. Section 23 05 13 – Common Motor Requirements for HVAC Equipment
- C. Section 23 05 48 – Vibration Controls for HVAC
- D. Section 23 09 23 – Direct-Digital Control for HVAC
- E. Section 23 21 13 – Hydronic Piping
- F. Section 23 21 16 – Hydronic Piping Specialties
- G. Section 23 31 00 – HVAC Ducts and Casings

1.3 REFERENCES

- A. General
- B. ARI 880-94 - Industry Standard for Air Terminals
- C. NFPA 90A - Installation of Air Conditioning and Ventilation Systems
- D. UL 181 - Factory-Made Air Ducts and Connectors
- E. NFPA 70 - National Electrical Code

1.4 SUBMITTALS FOR REVIEW (REVIEW TO SECTION 23 05 00)

- A. Product Data: Provide data indicating configuration, general assembly, and materials used in fabrication. Include catalog performance ratings which indicate air flow, static pressure, and NC designation. Include electrical characteristics and connection requirements.
- B. Submit schedule of air terminal units in same format as scheduled on the drawings indicating the performance of each air terminal unit at the specified operating conditions.
- C. Submit electrical characteristics and connection requirements.
- D.

1.5 PROJECT RECORD DOCUMENTS (REFER TO SECTION 23 05 00)

- A. Record actual locations of air terminal units, service areas and piping connections.

1.6 OPERATION AND MAINTENANCE DATA (REFER TO SECTION 23 05 00)

- A. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, maintenance and repair data, and parts lists. Include directions for resetting volume regulators.

1.7 REGULATORY REQUIREMENTS

- A. Products Requiring Electrical Connection: Listed and classified by Underwriters' Laboratories Inc., as suitable for the purpose specified and indicated.

1.8 DRAWING SCHEDULES

- A. Refer to equipment schedules on drawings for additional information.

PART 2 PRODUCTS

2.1 GENERAL AIR TERMINAL UNITS

- A. Manufacturers (Refer to Section 23 05 00):
 - 1. Krueger
 - 2. Nailor
 - 3. Price
 - 4. Titus
- B. VAV Supply Terminal Units with/without reheat
 - 1. Construction: Minimum 22-gauge galvanized steel casing; round stub air inlet connections in sizes noted on the drawings; slip and drive air outlet connection.
 - 2. Dampers: Galvanized steel volume damper(s) with peripheral gasket and self-lubricating bearings; maximum allowable damper leakage 2 % of design airflow at 3-inch inlet static pressure; linkages for damper as necessary; protective metal shroud for controls components; plenum air inlet, when provided, shall have finished metal edges with no exposed insulation and frame for attachment of 1 inch throwaway filter.
 - a. Fiberglass Liner (Standard): ½ inch, 1.5 pounds/feet³ density fibrous glass insulation meeting NFPA 90A flame and smoke requirements and UL 181 erosion requirements; black pigmented insulation coating conforming to NFPA 90A to resist erosion at velocities up to 5,000 FPM; exposed edges of liner coated with an NFPA 90A approved sealant to prevent entrainment of fibers in the airstream. Casing insulation shall be installed in a manner to preclude any raw edges or surfaces from contact with the airstream. Provide an EPA registered, anti-microbial agent on the surface coating so that the liner will not support the growth of fungus or bacteria. Anti-microbial agent shall be tested in accordance with fungi test ASTM C665 and G21 and bacterial test ASTM G22.
 - 3. Flow Sensors: Cross or annular ring configuration; located at the inlet of the terminal unit; multiple pressure sensing ports with averaging chamber; sensor shall provide amplified signal; 5 % accuracy with a 90-degree sheet metal elbow directly at the inlet of the assembly; external taps provide for calibration. An airflow (CFM) curve shall be affixed to the terminal unit expressing differential vs. CFM.
 - 4. Hot Water Heating Coil: Copper tube mechanically expanded into aluminum plate fins; leak-tested to 300 psi; 2000 psi minimum burst pressure at ambient temperature; factory installed as an integral part of air terminal unit. Coil shall be rated in accordance with ARI standard 410 and tested in accordance with ASHRAE standard 33. All coils shall be provided with a manual air

vent fitting. Valve core type vent fittings are not acceptable. Coils shall be rated for a minimum of 200 °F

5. Controllers and Actuators: Furnished by Section 23 09 23 and shipped to the terminal unit manufacturer for factory installation. Coordinate with Section 23 09 23 for actuator and controller requirements.
6. Certification: Air terminal units shall be certified under ARI standard 880-94 Certification Program and shall carry the ARI seal.
7. Accessories:
 - a. Unit casing shall have a 4" x 6.75" internally insulated bottom access with quarter turn sash what allows servicing of unit without disturbing duct connections. Terminal units with matt faced liner finish shall have dual wall construction. Perimeter shall be gasketed. Access door shall be located between the damper and the reheat coil.

PART 3 EXECUTION

3.1 GENERAL

- A. Verify that electric power is available and of the correct characteristics.
- B. Provide in accordance with manufacturer's instructions and as indicated.

3.2 INSTALLATION

- A. General
 1. Support units individually from structure. Do not support from adjacent ductwork.
 2. Provide a 30-inch minimum or (3) duct diameter, whichever is greater) straight section of sheet metal ductwork at inlet to terminal unit or air valve of same size as terminal inlet. When duct serving terminal unit is not of the same size as the inlet, a duct transition shall be provided upstream of this straight section.
 3. Connect to ductwork in accordance with Section 23 31 00.
 4. Controllers and actuators furnished under Section 23 09 23 shall be shipped to the terminal unit manufacturer for factory installation. Controls shall be installed such that dampers are normally open unless noted otherwise on the drawings.

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Disposable, Extended Area Panel Filters

1.2 RELATED SECTIONS

- A. Section 23 05 00 – Common Work Results for HVAC
- B. Section 23 73 00 – Indoor Central Station Air Handling Units

1.3 REFERENCES

- A. ARI 850 - Commercial and Industrial Air Filter Equipment
- B. UL 900 - Test Performance of Air Filter Units

1.4 PERFORMANCE TOLERANCES

- A. Conform to ARI 850 Section 7.4
- B. Dust Spot Efficiency: Plus or minus 5 %

1.5 SUBMITTALS FOR REVIEW (REFER TO SECTION 23 05 00)

- A. Provide data on filter media, filter performance data, filter assembly and filter frames, and dimensions, motor locations and electrical characteristics and connection requirements.

1.6 OPERATION AND MAINTENANCE DATA (REFER TO SECTION 23 05 00)

- A. Operation and Maintenance Data: Include instructions for operation, changing, and periodic cleaning.

1.7 EXTRA MATERIALS (REFER TO SECTION 23 05 00)

- A. In addition to the filters required for operating the equipment, provide an extra set of filters for each piece of equipment.

1.8 QUALITY ASSURANCE

- A. Provide all filters as product of one manufacturer.

PART 2 PRODUCTS

2.1 GENERAL

- A. Manufacturers (Refer to Section 23 05 00):
 - 1. Farr
 - 2. Cambridge

3. American Air Filter

2.2 DISPOSABLE, EXTENDED AREA PANEL FILTERS (MERV 13)

- A. UL 900 Class 2 media, pleated, lofted, non-woven, reinforced cotton and synthetic fabric, supported and bonded to welded wire grid; rigid, heavy duty frame, high wet strength beverage board ASHRAE 52 rated; 80 % to 85 % dust spot efficiency. Merv 13
 - 1. 2" thick (type 2a), 0.41" APD at 500 FPM (clean)
- B. Basis of Design: Camfil Farr AP-Thirteen.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Provide air cleaning devices in accordance with manufacturer's instructions and as indicated.
- B. Do not operate fan system until filters (temporary or permanent) are in place. Replace temporary filters used during construction and testing, with clean set.
- C. Refer to Section 23 05 00 for filters for temporary heating and ventilating. Filters shall not be less than Farr 30/30.
- D. Provide filters in accordance with schedule.

3.2 SCHEDULES

Equipment	Filter Type
AHU-1	MERV 13
AHU-2	MERV 13

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Manufactured vents for fuel fired equipment
- B. Combustion air intake pipes

1.2 RELATED SECTIONS

- A. Section 23 05 00 – Common Work Results for HVAC
- B. Section 23 05 13 – Common Motor Requirements for HVAC Equipment

1.3 REFERENCES

- A. ASTM A167 - Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip
- B. ASTM A525 - Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, General Requirements
- C. ASTM A527 - Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Lock-Forming Quality
- D. ASTM A569 - Steel, Sheet and Strip, Carbon (0.15 % Maximum) Hot-Rolled Commercial Quality
- E. NFPA 54 (ANSI Z223.1) - The National Fuel Gas Code
- F. NFPA 70 - National Electrical Code
- G. SMACNA - HVAC Duct Construction Standards - Metal and Flexible
- H. UL 103 - Standard for Factory Built Low Heat Chimneys
- I. UL 441 - Standard for Gas Vents
- J. UL 641 - Standard for Low Temperature Venting Systems
- K. UL 959 (ANSI Z181.1) - Medium Heat Appliance Factory Built Chimneys

1.4 DEFINITIONS

- A. Vent: That portion of a venting system designed to convey flue gases directly outdoors from a vent connector or from an appliance when a vent connector is not used
- B. Vent Connector: That of a venting system that conducts the flue gases from the flue collar of an appliance to a chimney or vent, and may include a draft control device

1.5 DESIGN REQUIREMENTS

- A. Factory built vents used for venting natural draft appliances shall comply with NFPA 211 and be UL listed and labeled.

1.6 SUBMITTALS FOR REVIEW

- A. Submit under Section 23 05 00.
- B. Shop Drawings: Indicate general construction, dimensions, weights, support and layout of breechings. Submit layout drawings indicating plan view and elevations.
- C. Product Data: Provide data indicating factory built vents, including dimensional details of components and flue caps, dimensions and weights, electrical characteristics and connection requirements.

1.7 REGULATORY REQUIREMENTS

- A. Conform to applicable code NFPA 54 (ANSI Z223.1) for installation of natural gas propane burning appliances and equipment.
- B. Conform to applicable code NFPA 31 (ANSI Z95.1) for installation of oil burning appliances and equipment.
- C. Products Requiring Electrical Connection: Listed and classified by Underwriters' Laboratories, Inc., as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.1 CATEGORY IV APPLIANCE VENTING

- A. General:
 - 1. For use on positive pressure venting system.
 - 2. All products shall conform the National Fuel Gas Code, ANSI Z223.1/SFPA-54 where applicable.
 - 3. Vent layout shall be designed and installed in compliance with manufacturer's installation instructions and all applicable local codes.
 - 4. Provide roof terminations for flues in accordance with the boiler manufacturer requirements.
 - 5. The vent system shall be continuous from the appliance's flue outlet to the vent termination outside the building. All systems components shall be UL/cUL listed and supplied by the same manufacturer.
 - 6. All systems components such as vent supports, roof or wall penetrations, terminations, appliance connectors and drain fittings required to install the vent system shall be UL/cUL listed and provided by the vent manufacturer.
 - 7. For exterior applications, outer wall shall be 304 Stainless Steel.
- B. Stainless Steel Flue Venting (condensing and non-condensing applications)
 - 1. Manufacturers (Refer to Section 23 05 00):
 - a. Saf-T Vent CI Plus (basis of design)
 - b. Metal-Fab
 - c. Security Chimneys
 - d. Duravent
 - 2. UL listed, Category IV listed, double wall air-insulated product for commercial applications.
 - 3. Vent material from one of the approved manufacturers listed in the boiler Installation and Operation manual.
 - 4. Tested and Listed by Underwriters Laboratories to UL 1738/ULC S636 for used with Listed natural gas or propane burning equipment that produce continuous flue-gas temperatures not above 550 F. Also Tested and Listed by Underwriters Laboratories to UL 641/ULC S609 for use

with Listed oil and gas burning equipment that are suitable for venting with Type L vent which produce continue flue-gas temperatures not above 570 F. The system is to be installed and sealed per manufacturers' instructions so all joints are gas tight, preventing leakage of products of combustion into a building.

5. Systems shall be a double-wall product that consists of a flue-gas conduit fabricated from AL 29-4C® stainless steel, which is highly suited for use with high-efficiency gas burning equipment, which produce excessive amounts of condensation in the vent. The outer jacket of the system is constructed of type 430 stainless steel with a space of approximately 1" between the flue-gas conduit and the jacket.
6. All joints shall be fastened with closure system that combines the features of tapered ends with a mechanical closure system which consists of tabs and a locking band. The locking band is tightened from a single location using a simple hand tool, pulling the two pieces together making a pressure tight assembly. The joints shall be sealed. Diameters 4" through 16" are manufactured with a factory installed integral seal. Diameters 18"-32" shall use an approved sealant on the job site. This closure system is tested to be gas tight at two and one-half times the Listed pressure rating of 15" water column.
7. The system shall be suitable for either interior or exterior installations. The system shall be capable of withstanding wind and incidental loads as required by UL standards.
8. When connected to gas-burning appliances with a maximum continuous flue-gas temperature of 550 F, 4" through 24" diameter venting can be fully enclosed vertically by combustible materials at 1" or greater clearance and 26"-32" diameter by 2" or greater clearance. For Oil fired Type L-Vent with a maximum flue-gas temperature of 570, 4" through 8" diameter a fully enclosed system requires 3" clearance. For horizontal applications refer to the manufacturers' Clearance Chart.

C. Polypropylene Flue Venting (condensing applications only)

1. Manufacturers (Refer to Section 23 05 00):
 - a. InnoFlue by Centrotherm (basis of design)
 - b. Polypro by Duravent
2. UL-1738 listed, Category IV, single wall polypropylene sealed vent
3. Vent shall be from one of the approved manufacturers listed in the boiler Installation and Operation manual.
4. The vent shall be of the single wall, factory-built type, designed for use in conjunction with Category IV condensing gas fired appliances, condensing oil fired appliances or as specified by the heating equipment manufacturer. Venting material located outdoors shall be treated to protect against UV.
5. Maximum continuous flue gas temperature shall not exceed 230 degrees F (110 degrees C).
6. Vent shall be listed for a maximum positive pressure rating of 20" w.c.
7. All systems components shall include a factory- installed gasket in their female-end to render the vent air and water tight when the male/female ends are pushed together as per manufacturer's instructions. Vent systems requiring field installed sealants or compounds shall not be acceptable.

8. The vent shall be constructed from Flame Resistant Polypropylene, with a min. wall thickness of:

Diameter		Wall Thickness Extruded Pipes	
<u>Diameter</u> <u>(mm)</u>	<u>Diameter</u> <u>(inch)</u>	<u>Min</u> <u>(inch)</u>	<u>Max</u> <u>(inch)</u>
DN 60	2"	0.0669	0.0866
DN 80	3"	0.0709	0.0945
DN 110	4"	0.0945	0.1260
DN 125	5"	0.1063	0.1457
DN 160	6"	0.1142	0.1772
DN 200	8"	0.1378	0.1772
DN 250	10"	0.1299	0.1850
DN 315	12"	0.1654	0.2283

2.2 COMBUSTION AIR INTAKE VENTING FOR BOILERS

- A. This section applies to boilers with sealed/ducted combustion air direct to the appliance.
- B. Intake piping must be of approved material as listed in the Boiler Installation and Operations manual. Provide roof or wall terminations for combustion air intakes in accordance with the boiler manufacturer requirements for terminations. Insulate in accordance with Section 23 07 00.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Provide in accordance with manufacturer's instructions, UL listings, and as indicated.
- B. Connect full size to appliance connections.
- C. Install in accordance with NFPA 211, 37, NFPA 54 (ANSI Z223.1.) NFPA 31 and UL listing.
- D. Install chimneys and vents with minimum of joints. Align accurately at connections, with internal surfaces smooth.
- E. Support chimneys and vents from building structure, rigidly with suitable ties, braces, hangers and anchors to hold to shape and prevent buckling. Support chimneys and vents and stacks at 12 feet maximum spacing, to adjacent structural surfaces, or at floor penetrations. Refer to SMACNA HVAC Duct Construction Standards - Metal and Flexible for equivalent duct support configuration and size and spacing.
- F. For factory built chimneys and vents, maintain UL listed minimum clearances from combustibles. Assemble pipe and accessories as required for complete installation and in accordance with manufacturer's recommendations.
- G. Level and plumb vents and chimneys and stacks.
- H. Clean vents, chimneys, and stacks during installation, removing dust and debris.
- I. At appliances, provide slip joints permitting removal of appliances without removal or dismantling, chimneys, vents, insulation or stacks.

- J. Make provisions for condensate drainage from venting and chimney system and exhaust systems. Pipe drain from tees to nearest floor drain.
- K. Provide all fittings, thimbles, flashing, etc., for a complete installation and terminate flue terminations and sealed combustion air intakes in accordance with code requirements with manufactured approved vent and intake caps.
- L. Provide neoprene wrap between supports and double wall vents and chimneys.
- M. Coordinate installation of dampers and induced draft fans. Install vent dampers, locating close to draft hood collar, and secured to vent.
- N. Provide chimneys and vents in accordance with the schedule.

3.2 SCHEDULES

Equipment	Chimney/Vents
Boiler- Condensing	Category IV Stainless Steel, Polypropylene

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Condensing Boilers (Owner Furnished, Contractor Installed)

1.2 RELATED SECTIONS

- A. Section 23 05 00 – Common Work Results for HVAC
- B. Section 23 21 16 – Hydronic Piping Specialties

1.3 REFERENCES

- A. CSA - Directory of Certified Appliances and Accessories
- B. ANSI Z21.13 - Gas-Fired Low-Pressure Steam and Hot Water Boilers
- C. ASME SEC 1 - Boiler and Pressure Vessel Codes - Rules for Construction of Heating Boilers
- D. ASME SEC 8D - Boilers and Pressure Vessel Codes - Rules for Construction of Pressure Vessels
- E. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum)
- F. NFPA 54 (AGA Z223.1) - National Fuel Gas Code
- G. NFPA 70 - National Electrical Code

1.4 SUBMITTALS FOR REVIEW (REFER TO SECTION 23 05 00)

- A. Product Data: Provide data indicating general layout, dimensions, and size and location of water, gas, and vent connections, and electrical characteristics and connection requirements.

1.5 SUBMITTALS AT PROJECT CLOSEOUT (REFER TO SECTION 23 05 00)

- A. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, cleaning procedures, replacement parts list, and maintenance and repair data.

1.6 REGULATORY REQUIREMENTS

- A. Conform to applicable code for internal wiring of factory wired equipment.
- B. Conform to ASME SEC 4 for boiler construction. Boilers shall be stamped with official ASME symbol.
- C. All boiler safety controls shall comply with ASME CSD-1 Code requirements.
- D. Entire boiler package including pressure vessel, painted steel jacket, insulation, burner, fuel train, hot water trim and combustion control system shall meet FM, UL, CSD-1, NFPA, and applicable State of Washington requirements.

1.7 DELIVERY, STORAGE, AND HANDLING (REFER TO SECTION 23 05 00)

- A. Protect units before, during, and after installation from damage to casing by leaving factory shipping packaging in place until immediately prior to final acceptance.

PART 2 PRODUCTS

2.1 CONDENSING HEATING WATER BOILERS

- A. Manufacturers (Refer to Section 23 05 00):
 - 1. Cleaverbrooks, Clearfire Model CFC Series
 - 2. Lochinvar Crest
- B. General Description
 - 1. Each unit shall be firetube type complete with boiler fittings and automatic controls. The boiler, with all piping and wiring, shall be factory packaged. Each boiler shall be neatly finished, thoroughly tested and properly packaged for shipping. Boiler design and construction shall be in accordance with Section IV of the ASME Code for hot water heating boilers with a maximum working pressure of 125 psig. The boiler shall be CSA (formerly AGA/CGA) approved as an indirect or direct vent boiler and comply with ASME CSD-1 Code requirements.
- C. Performance: Boiler Size and Ratings
 - 1. The capacity of each unit shall be indicated on the drawing schedule.

2.2 BOILER DESIGN

- A. Boiler shall be firetube type with stainless steel tubes and tube sheets. The boiler pressure vessel shall be completely insulated with a minimum of 2" of insulation and shall be encased in a metal cabinet with primer and finish coat of paint.
- B. The boiler shall have a maximum allowable working pressure of 125 psig and include a ASME safety relief valve set at 125 psig.
- C. Exhaust gases and flue gas condensation shall be collected in a polymer drain collection box complete with drain fitting for draining condensation from the products of combustion.
- D. A condensate neutralizing assembly, including wet seal trap with float operated primer valve, designed by the boiler manufacturer for this boiler shall be included and shipped loose for field installation by contractor. Condensate neutralization assembly shall be shipped complete with sacrificial limestone chips.
- E. Boiler shall be designed for sealed combustion air.

2.3 BURNER

- A. The burner shall modulate fuel and air for a minimum 5:1 turndown ratio.
- B. Gas shall be supplied to the boiler room at 10 inches w.c.

- C. Emissions: The boiler(s) shall operate with CO emissions less than 10 ppm and NO_x emissions less than 20 ppm (corrected to 3% O₂) while operating at no more than 4% O₂ (20% excess air) over the entire turndown range.

2.4 BOILER TRIM

- A. Safety valve(s) shall be ASME Section IV approved side outlet type mounted on the boiler water outlet. Size shall be in accordance with code requirements and set to open at 125 psig.
- B. Temperature and pressure gauge shall be mounted on top of the boiler.
- C. Low water cut-off probe with manual reset.
- D. Auxiliary low water cut-off, manual reset, shipped loose for field installation by contractor.
- E. Temperature controls including operating controller, modulating controller, and high limit controller.
- F. Low pressure gas pressure regulator shall be furnished factory installed for each boiler.

2.5 BOILER CONTROL

- A. The boiler control system shall be an integrated digital micro-processor device, complete with sequence indication, fault reset, mode selection, and parameter set-point. It shall include a control device with touch-screen display and shall be mounted at the front of the boiler panel for easy access and viewing.
- B. Controller shall provide for both flame safeguard and boiler control and shall perform the following functions:
 - 1. Burner sequencing with safe start check, pre-purge, electronic direct spark ignition, and post purge. Flame rod to prove combustion.
 - 2. Flame Supervision. The control shall provide pre-purge and post-purge and shall maintain a running history of operating hours, number of cycles, and the most recent six faults. The control shall be connected to a keyboard display module that will retrieve this information.
 - 3. Safety Shutdown with display of error.
 - 4. Modulating control of the variable speed fan for fuel/air input relative to load requirements.
 - 5. Gas pressure supervision, high and low.
 - 6. Combustion Air Proving Supervision.
 - 7. High Air Pressure [back draft too high] Supervision.
 - 8. The supply temperature and set-point temperature shall be displayed at all times by Touchscreen readout. Output shall be continuous PID via 4-20 mA current.
 - 9. Include the programming of system circulating pump and provide the programming of 2 heating loops if required.
 - 10. PID Load control for heating application and domestic water.
 - 11. Include prioritization for demand, rate limiting.
- C. All parameter input control set-points shall be factory downloaded with jobsite conditions programmed at the time of initial jobsite operation.
- D. Control shall include sensors for supply and return water sensing.
- E. Electrical power supply shall be 120 volts, 60 cycle, single phase for the fan and 120 volts for control circuit requirements.

- F. The boiler shall be capable of being controlled from the building energy management and control system (EMCS). It is the intent that the boiler be control from the EMCS system. The boiler shall be shipped from the factor capable of the following of controlling in the following fashion.
 - 1. Controller shall have BACnet communications output
 - 2. Each boiler shall be enabled and disabled from the control system
 - 3. Each boiler shall report status to the EMCS system for the purpose of calculating run time.
 - 4. Each boiler shall accept an analog input signal to reset the boiler water temperature. Boiler shall then fire off its own controls to maintain supply water setpoint.
 - 5. Each boiler shall output firing rate to the EMCS system
- G. The Local Touchscreen Display shall provide the following:
 - 1. Burner Control state, sequence
 - 2. Rate Control, manual adjustment
 - 3. Lockout Code
 - 4. Alert and Hold Reason
 - 5. Heating Setpoint
 - 6. Heating Time of Day setpoint
 - 7. First out and system status and diagnostics
 - 8. Control Temperatures
 - 9. Setup
 - 10. Flame Signal Measuring
- H. Boiler(s) shall be furnished with a Hydronic System Controller (HSC) for control of (4) existing non-condensing boilers and (2) new condensing boilers.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Provide in accordance with manufacturer's instructions and as indicated on drawings.
- B. Install in accordance with NFPA 54.
- C. Install boiler on concrete housekeeping base, sized minimum 6 inches larger than boiler base. Housekeeping pad not in Division 23. Furnish shop drawings and other required information in order to coordinate required size of housekeeping pads.
- D. Provide connection of natural gas service in accordance with NFPA 54 (AGA Z223.1) and NFPA 31.
- E. Provide piping connections and accessories as indicated. (Refer to Section 23 22 16, 23 21 23)
- F. Pipe relief valves to nearest floor drain/glycol tank.
- G. Provide all required boiler control wiring, low water cutoff and alarm wiring.
- H. Connect gas piping to boiler gas-train inlet with union. Piping shall be at least full size of equipment connection. Provide a reducer if required.
- I. Connect hot-water piping to supply and return boiler tapings with shutoff valve and union or flange at each connection.

- J. Boiler Venting:
 - 1. Install flue venting kit and combustion-air intake.
 - 2. Connect full size to boiler connections. Comply with requirements in Division 23 Section 23 51 00.
- K. Provide for connection to electrical service. Refer to Division 26.
- L. Install control wiring to field mounted electrical devices.

3.2 MANUFACTURER'S FIELD SERVICES

- A. Prepare and start systems under provisions of Section 23 05 00.
- B. Instruct operating personnel in operation and maintenance of units.
- C. Startup and testing shall be accomplished by a factory trained technician. Service technician performing startup shall provide a report of startup and test results for O & M Manual (Refer to Section 23 05 00).
- D. Testing shall include written reports on boiler firing rate, turndown efficiency, O₂, CO, and NO_x levels, flue gas temperature, ambient temperature, and all control settings.

3.3 SCHEDULES

- A. See schedule on drawings for model numbers, capacities, and additional information.

3.4 FIELD QUALITY CONTROL

- A. Perform tests and inspections and prepare test reports.
 - 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing and training.
 - a. Service representative shall have factory training on specific equipment furnished in this project and shall provide certificate from manufacturer of approval and training dates
- B. Tests and Inspections:
 - 1. Perform installation and startup checks according to manufacturer's written instructions. Complete startup form included with Boiler and return to Manufacturer as described in the instructions.
 - 2. Leak Test: Hydrostatic test. Repair leaks and retest until no leaks exist.
 - 3. Operational Test: Start units to confirm proper motor rotation and unit operation. Adjust air-fuel ratio and combustion.
 - 4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 - a. Check and adjust initial operating set points and high- and low-limit safety set points of fuel supply, water level and water temperature.
 - b. Set field-adjustable switches and circuit-breaker trip ranges as indicated.
- C. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other than normal occupancy hours for this purpose.
- D. Performance Tests:

1. Engage a factory-authorized service representative to inspect component assemblies and equipment installations, including connections, and to conduct performance testing.
2. Boilers shall comply with performance requirements indicated, as determined by field performance tests. Adjust, modify, or replace equipment to comply.
3. Perform field performance tests to determine capacity and efficiency of boilers.
4. Repeat tests until results comply with requirements indicated.
5. Provide analysis equipment required to determine performance.
6. Provide temporary equipment and system modifications necessary to dissipate the heat produced during tests if building systems are not adequate.
7. Notify Architect and Commissioning Agent in advance of test dates.
8. Perform a combustion analysis after installation and adjust gas valve per the Installation and Operations manual and note in startup report.
9. Document test results in a report and submit to Architect.
10. Provide certified combustion analyzer “tapes” for the lowest published firing rate and full fire.

3.5 DEMONSTRATION

- A. Engage a factory representative or a factory-authorized service representative for boiler startup and to train Owner’s maintenance personnel to adjust, operate, and maintain boilers.

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Air-Cooled chiller package (Owner Furnished, Contractor Installed)

1.2 RELATED SECTIONS

- A. Section 23 05 00 – Common Work Results for HVAC
- B. Section 23 05 13 – Common Motor Requirements for HVAC Equipment
- C. Section 23 05 23 – General Duty Valves for HVAC Piping
- D. Section 23 05 48 – Vibration Controls for HVAC
- E. Section 23 09 23 – Direct-Digital Control for HVAC
- F. Section 23 21 13 – Hydronic Piping
- G. Section 23 21 16 – Hydronic Piping Specialties
- H. Section 23 21 23 – Hydronic Pumps

1.3 REFERENCES

- A. ARI 550 - Water - Chilling Packages
- B. ASHRAE 15 - Safety Code for Mechanical Refrigeration
- C. ASHRAE 90A - Energy Conservation in New Building Design
- D. ASME SEC 8 - Boiler and Pressure Vessel Code
- E. NEMA MG 1 - Motors and Generators
- F. UL 465 - Central Cooling Air Conditioners

1.4 SUBMITTALS FOR REVIEW

- A. Section 23 05 00 - Submittals: Procedures for submittals
- B. Shop Drawings: Indicate components, assembly, dimensions, weights and loadings, required clearances, and location and size of field connections. Indicate valves, strainers, and thermostatic valves required for complete system.
- C. Product Data: Provide rated capacities, weights, specialties and accessories, electrical requirements and wiring diagrams.

1.5 SUBMITTALS AT PROJECT CLOSEOUT

- A. Section 23 05 00 - Project Finalization - Operation and Maintenance Data: Procedures for submittals
- B. Operation and Maintenance Data: Include start-up instructions, maintenance data, parts lists, controls, and accessories. Include trouble-shooting guide.

1.6 REGULATORY REQUIREMENTS

- A. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.
- B. Electrical connection points (lugs) shall be UL listed for use with both copper and aluminum wiring.

1.7 DELIVERY, STORAGE, AND PROTECTION

- A. Section 23 05 00 - Product delivery, storage and handling
- B. Comply with manufacturer's installation instructions for rigging, unloading, and transporting units.
- C. Protect units from physical damage.

1.8 WARRANTY (REFER TO SECTION 23 05 00)

- A. Provide five (5) year warranty under provisions of Section 23 05 00.
- B. Warranty: Include coverage for complete assembly including materials only.

1.9 MAINTENANCE SERVICE (REFER TO SECTION 23 05 00)

- A. Provide service and maintenance of complete assembly for one (1) year from Date of Substantial Completion.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers (Refer to Section 23 05 00):
 - 1. Daikin

2.2 MANUFACTURED UNITS

- A. Provide factory assembled and tested outdoor air cooled liquid chillers consisting of compressors, condenser, evaporator, thermal expansion valve, refrigeration accessories, and control panel. Construction, testing, and ratings shall be in accordance with applicable sections of AHRI 550/590.
- B. Unit shall comply with NEC and shall be UL or ETL 1995 listed and labeled.
- C. Conform to ASME SEC 8 Boiler and Pressure Vessel Code for construction and testing of evaporators and condensers where applicable and required by code..

- D. Conform to ASHRAE 15 code for construction and operation of water chillers.
- E. Conform to the latest version of ASHRAE 90.1.

2.3 COMPRESSORS

- A. The compressors shall be sealed hermetic, scroll type with crankcase oil heater and suction strainer, R 410A. The compressor motor shall be refrigerant gas cooled, high torque, with inherent thermal protection on all three phases and shall be mounted on RIS vibration isolator pads. The compressors shall be equipped with an internal module providing compressor protection and communication capability. Each compressor shall have an oil charging valve and site glass.

2.4 EVAPORATOR

- A. The evaporator shall be a compact, high efficiency, dual circuit, brazed plate-to-plate type heat exchanger consisting of parallel stainless-steel plates.
- B. The evaporator shall be protected with an external electric resistance heater plate and insulated with 3/4" (19 mm) thick closed-cell polyurethane insulation. This combination shall provide freeze protection down to -20°F (-29°C) ambient air temperature.
- C. The water-side working pressure shall be a minimum of 150 psig (4502 kPa) and tested to 225 psig. Vent and drain connections shall be provided in the inlet and outlet chilled water piping by the installing contractor.
- D. Flow Switch: The evaporator shall be equipped with a factory-mounted and wired flow switch and strainer.

2.5 CONDENSERS

- A. Condenser fans shall be propeller type arranged for vertical air discharge and individually driven by direct-drive fan motors. The fans shall be equipped with a heavy-gauge vinyl-coated fan guard. Fan motors shall be TEAO type with permanently lubricated ball bearings, inherent overload protection, three-phase, direct-drive, 1140 rpm. Each fan section shall be partitioned to avoid cross circulation. Fans shall be low sound and constructed of corrosion resistant glass fiber or aluminum.
- B. Coil shall be microchannel design and shall have a series of flat tubes containing multiple, parallel flow microchannels layered between the refrigerant manifolds. Tubes shall be 9153 aluminum alloy. Tubes made of 3102 alloy or other alloys of lower corrosion resistance shall not be accepted. Coils shall consist of a two-pass arrangement. Each condenser coil shall be factory leak tested with high-pressure air under water. Coils shall withstand 1000+ hour acidified synthetic sea water fog (SWAAT) test (ASTM G85-02) at 120°F (49°C) with 0% fin loss and develop no leaks.
- C. Unit shall be capable of starting and stopping at ambient temperatures of 40°F to 115°F.

2.6 REFRIGERANT CIRCUIT

- A. Provide refrigerant circuits, factory supplied and piped. Refer to Section 23 23 00.
- B. Provide for each refrigerant circuit:
 - 1. Liquid line solenoid valve
 - 2. Filter dryer (replaceable core type). Liquid line sight glass and moisture indicator.

3. Expansion valve sized for maximum operating pressure
 4. Charging valve
 5. Insulated suction line
 6. Discharge line check valve
 7. Compressor discharge service valve
 8. High pressure relief valve
 9. Suction line accumulator
- C. Each chiller shall have a minimum of two (2) independent refrigerant circuits - each served by separate compressors for standby capability.
- D. Unit casing, structural members and rails shall be fabricated of painted steel, and shall be able to pass a 1,000-hour salt spray test per ASTM B117. The control enclosure and unit panels shall be corrosion resistant painted before assembly.
- E. The chiller shall be capable of stable operation to a minimum of 25% of full load without hot gas bypass. Hot gas bypass shall be provided on the lead compressor to allow 4:1 modulation of the lead compressor.
- F. Refrigerant circuit shall utilize R32 refrigerant.

2.7 CONTROLS/SAFETY FEATURES

- A. Chiller shall be factory furnished with a NEMA rated unit mounted weatherproof control panel(s) housed in a weatherproof enclosure constructed of steel panels with weather resistant baked enamel finish. Control panel(s) shall include the following:
1. Microprocessor-based control panel that includes the following functions as a minimum.
 - a. Automatic compressor lead/lag switching (if applicable)
 - b. Capacity control based on leaving chilled fluid temperature with return fluid temperature sensing.
 - c. Display module shall be capable of displaying set points, time system status (including temperatures, pressures, and percent loading), and any alarm or alert conditions.
 - d. Control module, in conjunction with the micro-processor, shall be capable of displaying the output of a run test to verify operation of every switch, sensor, potentiometer, and compressor before chiller is started.
 2. Safety Controls - Unit shall be equipped with all necessary components, and in conjunction with the control system shall provide the unit with protection against the following:
 - a. Loss of refrigerant charge
 - b. Reverse rotation
 - c. Low chilled fluid temperature
 - d. Low oil pressure
 - e. Under/over voltage
 - f. Ground current
 - g. Thermal overload
 - h. High pressure
 - i. Electrical overload
 - j. Loss of phase
 - k. Loss of chilled water flow
 - l. Phase reversal
 - m. Momentary power loss
 - n. Phase unbalance

3. Integral starter
4. Non-fused disconnect switch
5. Control transformer (120V secondary) or terminals for control power
6. Single point power connection
7. Provide mechanical interlock to disconnect power when door to starter is opened.
8. High fault rated control panel with 65,000 amp short circuit current rating.

2.8 CABINET

- A. Units shall be constructed of galvanized steel frame and galvanized steel panels. Component surfaces shall also be painted and be able to withstand a 1,000-hour consecutive salt spray test in accordance with ASTM B117.

2.9 MISCELLANEOUS FEATURES

- A. Upper section of unit shall have protective and decorative louvers covering the coils and unit end (hail guard); base section of unit shall have protective, 12 GA, PVC-coated, wire grille guards and have painted steel wraps enclosing the coil end sections and piping.
- B. Low ambient operation down to 30 degrees F.
- C. Compressor Sound Reduction - Acoustic reduction blankets shall be factory installed on each compressor.

2.10 PERFORMANCE

- A. See schedule on drawings for capacities, manufacturer, model number, electrical characteristics.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Provide in accordance with manufacturer's instructions and as indicated on drawings.
- B. Align chiller package on steel or concrete foundations.
- C. Install units on vibration isolation. Refer to Section 23 05 48 for vibration and seismic controls.
- D. Connect to electrical service. Refer to Division 26.
- E. Connect to chilled water piping. Refer to Section 23 21 13.
- F. Arrange piping for easy dismantling to permit tube cleaning.
- G. Connect piping with flexible connections. Refer to Section 23 05 48.

3.2 MANUFACTURER'S FIELD SERVICES (REFER TO SECTION 23 05 00)

- A. Prepare and start systems.

- B. Supply service of factory trained representative for a period of one (1) day to supervise testing, dehydration and charging of machine, start-up, and instruction on operation and maintenance to Owner.
- C. Supply initial charge of refrigerant and oil.

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Plenum Fans and Motors
- B. Water Coils

1.2 RELATED SECTIONS

- A. Section 23 05 00 – Common Work Results for HVAC
- B. Section 23 05 13 – Common Motor Requirements for HVAC Equipment
- C. Section 23 05 48 – Vibration Isolation
- D. Section 23 05 93 – Testing, Adjusting, and Balancing
- E. Section 23 09 23 – Direct-Digital Control for HVAC
- F. Section 23 09 95 – Variable Frequency Drives
- G. Section 23 21 13 – Hydronic Piping
- H. Section 23 21 16 – Hydronic Piping Specialties
- I. Section 23 22 13 – Steam and Condensate Heating Piping
- J. Section 23 25 00 – HVAC Water Treatment
- K. Section 23 40 00 – Air Cleaning Devices

1.3 REFERENCES

- A. ANSI/AFBMA9 - Load Ratings and Fatigue Life for Ball Bearings
- B. ABMA STD 11 - Load Ratings and Fatigue Life for Roller Bearings
- C. AMCA 99 - Standards Handbook
- D. AMCA 210 - Laboratory Methods of Testing Fans for Rating
- E. AMCA 300 - Test code for Sound Rating Air Moving Devices
- F. AMCA 301 - Methods of Publishing Sound Ratings for Air Moving Devices
- G. AMCA 500 - Test Methods for Louvers, Dampers and Shutters
- H. ARI 410 - Standard for Forced-Circulation Air-Cooling and Air-Heating Coils

- I. ARI 435 - Standard for Application of Central-Station Air-Handling Units
- J. NEMA MG1 - Motors and Generators
- K. NFPA 70 - National Electrical Code
- L. UL 1995 - Standard for Safety - Heating and Cooling Equipment
- M. UL 508 - Standard for Industrial Control Panels

1.4 SUBMITTALS FOR REVIEW (REFER TO SECTION 23 05 00)

A. General

- 1. Statement of Conformance: The submittals shall be accompanied by a statement of conformance by the supplier. This statement of conformance shall indicate that the equipment, as installed, will meet all of the requirements of these specifications. If the equipment will not meet each requirement of these specifications, this statement of compliance shall indicate each individual requirement that cannot be met, the impact this might have on the system, and the proposed method of equivalent compliance.
- 2. Testing: Provide testing procedures to be performed in accordance with these specifications. When field testing is required, provide the name of the testing agency(ies) to be utilized.
- 3. Indicate weights, fan performance, coil capacities, ratings, gages and finishes of materials, and electrical characteristics and connection requirements.
- 4. Unit Manufacturer shall provide certified ratings conforming to the latest edition of AMCA 210, 300, 500, and AHRI 410 as applicable.

B. Electrical

- 1. Indicate motor sizes and electrical characteristics.

C. Fans

- 1. Construction: Indicate type, material, blade type, class, shaft material and type of attachment to wheel and sheaves, base construction, safety screen and belt guard construction, seismic and fan thrust restraint and vibration isolation provisions. Detail flow measurement station when required.
- 2. Performance Information: Provide all information indicated in the equipment schedule. Performance shall be based on the design external static pressure plus the internal static pressure of the unit as submitted for the design airflow. For units with fan array provide fan performance for all fans operating and one fan failed.
- 3. Fan Curves: Provide certified fan curves for each fan with design flow and pressure plotted. Curves shall be provided on a chart with flow on the x-axis and pressure on the y-axis. Brake horsepower shall be indicated on the chart sufficient to determine the brake horsepower at any given point on the curve.

D. Coils

- 1. Construction: Indicate casing, tube, fin, header, and rack construction, including tube diameter and fin spacing. Indicate coils are fully drainable and show vents and drains.
- 2. Performance Information: Provide all information indicated in the equipment schedule.

- E. Submit the manufacturer's installation manual & equipment specific startup documents as a part of the initial equipment submittal.

- F. Submit the manufacturer's operating and maintenance manual as a part of the initial equipment submittal.

1.5 OPERATION AND MAINTENANCE MATERIALS (REFER TO SECTION 23 05 00)

- A. Provide the following minimum information: Fan and coil performance; fan curve information; lubrication instructions including lubrication points, type of lubrication to be provided, and frequency of lubrication; instructions for motor and drive replacement; wiring diagrams; customized spare parts list with unit tag #, serial #, OEM part #/description for motor, coil, bearings, drives, sheaves, fan shaft, belts and other commodity components.

1.6 REGULATORY REQUIREMENTS

- A. Electrical connection points (lugs) shall be UL listed for use with both copper and aluminum wiring.
- B. Fan performance ratings shall be AMCA certified in accordance with AMCA 210. Fans shall bear the AMCA sticker.
- C. Sound ratings shall be AMCA certified in accordance with AMCA 300.
- D. Coil capacities, pressure drops, and selection procedures shall be ARI certified in accordance with ARI 410.
- E. Fabrication shall conform to AMCA 99 and ARI 435 as applicable.

1.7 QUALITY ASSURANCE/QUALIFICATIONS

- A. Components shall be products of manufacturing firms regularly engaged in production of such equipment whose products have been in satisfactory use in similar service for not less than ten (10) years.
- B. Units shall be constructed for stable operation (without excessive vibration and surging) with inlet and outlet plenums engineered by the manufacturer. The manufacturer shall consider the duct connection locations as well as the external ductwork and associated velocities that attach to the unit.

1.8 EFFICIENCY STANDARDS

- A. Units that require a 10 % or greater increase in fan brake horsepower than the scheduled equipment to meet the design flow and external static pressure requirements will not be considered equal and will not be accepted.

1.9 DELIVERY, STORAGE, AND HANDLING (REFER TO SECTION 23 05 00)

- A. Deliver, store and handle in accordance with the manufacturer's requirements.
- B. Accept products on site in factory-fabricated protective containers, with factory-installed shipping skids and lifting lugs. Inspect for damage.
- C. Store in clean dry place and protect from weather and construction traffic. Handle carefully to avoid damage to components, enclosures, and finish.

1.10 ENVIRONMENTAL REQUIREMENTS

- A. Do not operate units until both the space and ductwork are clean, filters are in place, bearings lubricated, and fan has been test run under observation.

1.11 EXTRA MATERIALS (REFER TO SECTION 23 05 00)

- A. Fan bearings – One (1) for each different size and/or type of bearing

1.12 DRAWING SCHEDULES

- A. Refer to equipment schedules on drawings for additional information.

PART 2 PRODUCTS

2.1 GENERAL AIR HANDLING UNIT CONSTRUCTION FEATURES:

- A. Fans and Motors
 - 1. Unit Fans - All fans shall meet the air flow performance specified and shall not exceed the brake horsepower specified on the mechanical equipment schedule. Fan performance shall be based on testing and be in accordance with AMCA Standards 210 and 300.
 - 2. Direct Drive Plenum Fans (see schedule for applicable air handlers)
 - a. The fan shall include direct driven, arrangement 4 plenum fan constructed per AMCA requirements for the duty specified. Class I fans are not acceptable. Fan wheels shall be aluminum construction and rated in accordance with and certified by AMCA for performance. All fans shall be selected to deliver the specified airflow quantity at the specified operating Total Static Pressure and specified fan/motor speed. The fan shall be selected to operate at a system Total Static Pressure that does not exceed 90% of the specified fan's peak static pressure producing capability at the specified fan/motor speed. Each fan/motor assembly shall include a minimum 14 gauge spun steel fan inlet funnel, and a G90 galvanized steel motor support plate and fan base with internal RIS isolation.
 - b. All motors shall be standard foot mounted type TEFC selected at the specified operating voltage, RPM, and premium efficiency. Motors shall meet the requirements of NEMA MG-1 Part 30 and 31, section 4.4.2. Motors shall be as manufactured by Baldor, Siemens, or Toshiba that operate at varying synchronous speeds as driven by an approved VFD. Motor HP shall not exceed the scheduled HP as indicated in the equipment schedule. Steel cased motors and/or ODP motors are not acceptable. All motors shall include permanently sealed L10-400,000 hr bearings with shaft grounding to protect the motor bearings from electrical discharge machining due to stray shaft currents. Each fan/motor assembly shall be dynamically balanced to meet AMCA standard 204-96, exceeding category BV-5, to meet or exceed an equivalent Grade G.55, producing a maximum rotational imbalance of .022" per second peak, filter in. Motors shall be premium efficiency. See specification section 23 05 13 for additional motor requirements.
 - c. General: Centrifugal; unhooded; plenum type; single width; single inlet; backward inclined airfoil blades.
 - d. Wheel: Heavy gauge aluminum construction; tapered spun wheel cone; continuously welded airfoil blades; statically and dynamically balanced; Class II or III as required for the specified operating pressure.
 - e. Safety Screens: Enclosed safety screen around fan assembly. Inlet screen at fan inlet.

- f. Vibration Isolation Springs: Free-standing, un-housed, open type springs with leveling bolts and neoprene isolation pads; minimum 2 inch (50 mm) deflection; selected and rated for a minimum efficiency of 98 to 99 %.
 - g. Fan Thrust Restraints: Provided, when applicable, to prevent the spring isolator system from grounding against the floor, walls, seismic restraints, or tearing the fan flexible connection.
 - h. Flow Measurement Station: Integral, continuously monitoring air flow device; capable of producing a steady non-pulsating pressure differential signal; air flow gauge mounted on unit exterior with CFM readout; demonstrated laboratory accuracy of 97 %; port connections for transducer provided by Section 23 09 23. The probes for air measurement shall be produced in accordance with ASHRAE Standard 51-1985 AMCA standard 210-85, Figure 2A for static pressure taps.
 - i. Variable Air Volume Device—Variable Frequency Drive
 - 1) The unit shall be capable of delivering variable air volume by means of a variable frequency drive. Variable frequency drives shall be provided with the unit in accordance with Section 23 09 95. Provide one drive for each fan.
- B. Water Coils
- 1. General: Counterflow design (except single row); fully drainable with no trapped tubes; drains and vents provided on each coil; drains extended to the exterior of the cabinet. Leak tested to 315 psi under water and again after assembly with compressed air at 315 psi.
 - 2. Casing: Minimum 16 gauge galvanized steel; pressed or extruded tube holes; reinforcing rods such that maximum unsupported length is 60 inches; formed face and stacking flanges on all sides; enclose coils with headers and return bends fully contained within casing.
 - 3. Mounting: Provide access to both sides of coils. Provide removable panels in unit wall for coil removal. Provide sealing collars at connection penetrations through unit wall.
 - 4. Tubes: 5/8 inch x 0.020 inch seamless copper tube; brazed connections; expanded into fin collars to provide a permanent mechanical bond.
 - 5. Fins: Corrugated 0.008 inch aluminum
 - 6. Headers: Non-ferrous seamless copper; brazed joints.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Provide vibration isolation in accordance with 23 05 48.
- B. Make all duct and piping connections to units as indicated on the drawings.
- C. Piping connections to coils shall be made with unions or flanges.
- D. Install piping and ductwork to allow proper access to unit access doors and to facilitate coil removal.
- E. Provide required sheaves to achieve final air balance at no additional cost. This applies to fixed as well as adjustable sheaves.
- F. The contractor shall field verify all existing conditions, including but not limited to, the dimensions, unit configuration, access prior to ordering and installation. This contractor is responsible for all required unit modification for the replacement and installation of all new components.

- G. The unit should be leak tested prior to demolition and upon completion of construction to confirm the unit is returned to original operating conditions. Should the unit fail to achieve pre-construction airflow performance and leakage rates, it is this contractor's responsibility to engage an Air Handling Unit Manufacturer to correct any deficiencies in the work.

3.2 TRAINING

- A. Provide the service of a factory qualified technician to conduct O&M training in maintenance and operation of unit. Include hands on demonstration as part of the training session.
- B. Technician shall be factory trained on this type of equipment. Submit certificates and training dates.

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Electric Radiant Heaters

1.2 RELATED SECTIONS

- A. Section 23 05 00 – Common Work Results for HVAC

1.3 REFERENCES

- A. NFPA 70 - National Electrical Code

1.4 SUBMITTALS FOR REVIEW

- A. Submit in accordance with Section 23 05 00.
- B. Product Data: Provide rated capacities, weights, specialties and accessories, electrical requirements and wiring diagrams.

1.5 SUBMITTALS AT PROJECT CLOSEOUT

- A. Submit under provisions of Section 23 05 00.
- B. Project Record Documents: Record actual locations of panels, pipe connections, etc.

1.6 REGULATORY REQUIREMENTS

- A. Products requiring electrical connections: listed and classified by UL as suitable for the purpose specified and indicated.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Unit shall be handled and stored in accordance with the manufacturer's instructions.

PART 2 PRODUCTS

2.1 ELECTRIC RADIANT HEATERS

- A. Manufacturer (Refer to Section 20 10 00 Basic Mechanical Requirements)
 - 1. Brasch
 - 2. Qmark
 - 3. Runtal
- B. See drawings for arrangement, capacities and dimensions.
- C. Radiators shall be manufactured of 18 gauge steel with 14-gauge aluminum front and top cover. Single piece top and front. Both inlet and outlet grilles shall be punched pencil-proof slots. Finished in high

- gloss, baked or anodized enamel paint, color to be confirmed by the Architect. Supply air shall be drawn through a stamped louver periphery evenly across the heating element, and discharged through an outward drawn venture.
- D. Heaters shall be ETL listed and tested in accordance with the latest version of ANSI/UL Standard 1996 for zero clearance from all combustibles and shall bear the ETL listing mark. Each heater shall meet the requirements of NEC and shall be of the open coil design.
 - E. Elements shall be stainless steel with aluminum fins. Elements shall be center anchored and float freely at each end.
 - F. Contactors are factory installed and wired. Only direct line supply and thermostat connections in the field by Division 23 are required. Units are warranted to be free of defective material and workmanship for a period of one year with the exception of the heating elements which are warranted for five years.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install equipment exposed to finished areas after walls and ceiling are finished and painted. Avoid damage.
- C. Protection: Provide finished cabinet units with protective covers during balance of construction.

3.2 CLEANING

- A. After construction is completed, including painting, clean exposed surfaces of units. Vacuum clean coils and inside of cabinets.
 - 1. Touch-up marred or scratched surfaces of factory-finished cabinets, using finish materials furnished by manufacturer.

END OF SECTION

DIVISION 26
ELECTRICAL

PART 1 GENERAL

1.1 CONDITIONS AND REQUIREMENTS

- A. Refer to instructions to bidders, general conditions, supplementary general conditions, and Division 1 of these specifications that govern work under Division 26. Refer to other sections of these specifications for additional related requirements.

1.2 SCOPE OF WORK

- A. The work covered by the Electrical Section (Division 26) of the specifications shall include:
 - 1. Furnishing all materials and supplying all labor, equipment, and services to install the electrical systems as shown on the accompanying drawings and specified herein.
 - 2. Testing and adjusting of the completed electrical systems in the manner described herein.

1.3 CODES, PERMITS AND FEES

- A. Electrical work shall be in complete accordance with the latest revised edition of the following:
 - 1. National Electrical Code
 - 2. International Building Code
 - 3. International Mechanical Code
 - 4. International Fire Code
 - 5. Americans with Disabilities Act
 - 6. Electrical Safety Orders of the State Department of Labor and Industries
 - 7. Regulations of the State Fire Marshal
 - 8. Regulations of the State Board of Fire Underwriters
 - 9. Requirements of Washington State Industrial Safety and Health Administration (WISHA)
 - 10. Washington Administrative Code
 - 11. Applicable sections of other State and local codes
- B. In case of differences between building codes, state laws, local ordinances, utility company regulations, and Contract Documents, the most stringent shall govern. Promptly notify Owner's Representative in writing of such differences.
- C. The Contractor, at their expense, shall obtain permits and inspections required for the electrical work on this project. Inspection certificates shall be included in the Operation and Maintenance Manuals. Deliver copies thereof to the Architect prior to final acceptance of the work.
- D. The Contractor shall pay all costs levied by utility companies and/or governing agencies associated with electrical service, telephone service, and cable TV service connections and include these costs within their bid. This shall include but not limited to tap fees, service mains, meter, and vault charges, etc.
- E. Comply with serving utility regulations.

1.4 INTENT AND INTERPRETATIONS

- A. It is the intent of these specifications and the accompanying drawings to result in a complete electrical installation in complete accordance with all applicable codes and ordinances.

- B. The drawings and specifications are intended to supplement each other, and any details contained in one and not the other shall be included as if contained in both. Items not specifically mentioned in the specifications or noted on the drawings, but which are necessary to properly complete the installation of the indicated systems or to render the systems operational, shall be provided, unless specifically excluded.
- C. If any discrepancies of any kind exist, or that required items or details have been omitted, the Contractor shall notify the Architect in writing of such discrepancy or omission at least five (5) days prior to bid date. Failure to do so shall be construed as the willingness of the Contractor to supply all necessary materials and labor required for the proper completion of this work.

1.5 DEFINITIONS

- A. The term "The Contractor", when used in Division 26 of the specifications, shall be construed to mean the Contractor for the electrical work.
- B. The term "Electrical Systems Installer", where used in Division 26 of the specifications, refers to the firm, licensed by the State to perform electrical installation, which is responsible for immediate supervision of electrical work on the project.
- C. The word "provide", where used in this specification and on the accompanying drawings, shall mean furnish and install.

1.6 DRAWINGS

- A. The Electrical Drawings shall serve as the working drawings for the electrical work, but the Architectural Drawings shall take precedence over the Electrical Drawings if any dimensional discrepancies exist. The Electrical Systems Installer shall review the plans for the work of the other trades and shall adjust their work to conform to all conditions indicated thereon.
- B. Work covered under Division 26 has been indicated on the drawings in locations that should allow installation without interfering with the work of other trades; however, exact finish locations have not been indicated. Therefore, locations of all work and equipment shall be verified to avoid interferences, preserve headroom, provide access for maintenance, and keep openings and passageways clear. Changes shall be made in the location of equipment and materials as required to accomplish these purposes without additional claims or charges by the Contractor.
- C. 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 10 foot radius of the indicated location. Where connection points are not within this radius, the Contractor shall contact the Architect for a decision before proceeding or may proceed at their own expense.
- D. At the beginning of the work, the Contractor shall set aside one complete set of the drawings which shall be maintained as a complete Record Drawings set. The Record Drawings set shall include one set of drawings for the facility conduit plan prepared by this Contractor as described in this specification. Notations shall be done in a neat and legible manner using RED ink as specified in Division 1 and in accordance with the Architect's instructions.
 - 1. The record drawings shall be updated daily by the foreman to show every change from the original drawings and the exact locations, sizes, and kinds of equipment. This set of drawings shall not be used for any other purpose and shall be maintained at the job site and available for review at any time.

2. Record drawings shall indicate actual size of electrical equipment routing of major raceway systems and location of control devices.
 3. The actual location and elevation of all buried lines, boxes, monuments, stub-outs, and other provisions for future connection shall be shown on the record drawings and shall be referenced to the building lines or approved benchmarks.
 4. Upon completion of the job, the Contractor shall deliver the Record Drawings marked-up to the Architect.
 5. It shall be acceptable to maintain record drawings described herein in an electronic format (PDF) subject to the provisions noted above. Where Record Drawings are maintained in electronic format, they shall be available for review at any time.
- E. By the act of submitting a bid, the Contractor shall be deemed to have:
1. Examined the site and familiarized themselves with the conditions affecting the work. No additional allowance shall be granted because of lack of knowledge of such conditions.
 2. Verify all measurements at the building and acquaint themselves with the existing conditions before submitting their bid proposal.
 3. Examined all architectural, structural, mechanical, and other applicable drawings.
 4. Become familiar with the electrical drawings and specifications.
 5. Developed an understanding of the electrical system requirements.
 6. Discussed the project with the Electrical System Installer and determined that he can successfully execute the electrical work.
 7. Accepted such conditions and included allowances for them in their bid.

1.7 ELECTRICAL COST BREAKDOWN

- A. Refer to Division 01.
- B. The Contractor shall furnish to the Owner's Representative a breakdown of the electrical construction cost within thirty (30) days of notice to proceed. The breakdown shall be in general conformance with the following:
1. Bonds, Permits, Fees
 2. Cartage, Rentals, Shack
 3. Supervision
 4. Demolition
 5. Feeder Conduit and Wire
 6. Feeder Labor
 7. Branch Circuit Conduit and Wire
 8. Branch Circuit Labor
 9. Devices and Plates
 10. Trim Labor
 11. Panelboard(s)
 12. Switchgear Labor
 13. Disconnects and Miscellaneous Materials
 14. Equipment Connection Labor
 15. Miscellaneous Systems
 16. Miscellaneous Systems Labor

1.8 TEMPORARY ELECTRICAL SERVICES

- A. Refer to Division 01.

- B. Furnish and install a complete electrical system to provide temporary power, lighting and exit lighting to the project during construction.

1.9 PAYMENT REQUESTS

- A. Refer to Division 01.
- B. Payment requests for materials and equipment will not be reviewed or approved until shop drawings have been received and approved.

1.10 GUARANTEE

- A. The electrical equipment and installation shall be guaranteed for a period of one (1) year from date of acceptance unless an individual item or specification is otherwise noted as longer. The Contractor shall make good at their own expense all defects in their work, and/or equipment furnished by them, which shall develop at any time during the one-year guarantee period and shall stand any expense of cutting, patching, and repairing made necessary by their corrections of unsatisfactory work or equipment operation.

1.11 ALTERNATES

- A. See Division 01 for a list of alternates to bid for this project. The Contractor shall include cost of their bid for complete working electrical system as described in the alternates and shown on the drawings.

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

- A. Materials used under this Contract, unless specifically noted otherwise shall be delivered to the site new, in their original unbroken packages and shall be of the best quality of their respective kind and shall conform to the latest Standard Specifications of the American Society for Testing Materials, National Electrical Manufacturers' Association, National Board of Fire Underwriters or another appropriate agency. Standard items shall bear the stamp indicating listing by Underwriter's Laboratories, Inc. when such listing is available. Custom-designed items shall be fabricated of UL approved materials.
- B. Throughout these specifications various materials, equipment, apparatus, and the like, are specified by manufacturer, brand name, type, or catalog number. Such designations are to establish standards of desired quality and construction and shall be the basis of the bid.
- C. Substitutions will be allowed only as herein provided. No substitutions will be permitted without the Architect's written acceptance. Refer to Division 01 of these specifications for additional requirements.
 - 1. All prior acceptance submittals shall be accompanied by a transmittal letter indicating date, project name, product description/type, and deviations from contract documents if any.
 - 2. Subject to the Architect's discretions certain items may be considered for substitution only after samples have been submitted for review.
- D. Contractors wishing to bid on equipment other than that listed shall obtain prior acceptance of same. Unless prior acceptance (By Addendum) is issued to all bidders, the Contractor will be held to furnish all items exactly as scheduled and/or specified.

- E. Unauthorized product substitution will be removed from the job site and replaced with the specified item at the Contractor's expense.

2.2 EQUIPMENT/MATERIAL SUBSTITUTIONS

- A. 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.
- B. Substitutions will not be permitted without written approval
- C. Where two or more manufacturer designations are listed in these specifications, choice will be optional with the Contractor except where more than one manufacturer is listed, and only one manufacturer's catalog number is specified or only one manufacturer 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).
- D. If the Division 26 Contractor uses manufacturers other than the basis of design, the Contractor shall be responsible for:
 - 1. Insuring the substituted item will fit the available space while allowing proper maintenance access.
 - 2. Any changes required by other Contractors caused by the substituted equipment.
- E. 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.
- F. See Division 01 for product prior approval requirements.

2.3 OWNER FURNISHED EQUIPMENT AND MATERIALS

- A. The Contractor shall accept and become responsible for all Owner furnished equipment and materials. Inspect all equipment and materials to determine suitability for installation. Immediately notify the Owner of any defects or deficiencies. Failure to notify the Owner shall mean that the Contractor warrants that all equipment and materials are of the proper quantity, design and are free from all defects. Store all equipment and materials properly.

2.4 SUBMITTALS FOR REVIEW

- A. Shop Drawings
 - 1. Refer to Division 01.
 - 2. 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 26.
 - 3. Provide specific wiring diagrams for all equipment requiring electrical or control wiring. Upon approval, copies of these diagrams shall be forwarded to pertinent contractors.
 - 4. Shop drawing shall be generated using a computer aided drafting program; as-built drawings and .DWG or .DXF files of the facility conduit plan shall be delivered to the Architect. CAD floorplans of the contract documents will be provided by the Owner's representative on a thumb-drive or transmitted electronically to the Electrical Contractor in .DWG format only after completion of an "Consent for the Release of Electronic Files" (forwarded by the Owner's representative on request).

- B. All submittals shall be electronic unless specifically noted otherwise and are subject to all the following conditions. Submittals which do not comply with all these conditions will be rejected.
 - 1. Electronic submittals shall be submitted in the current version of Adobe Portable Document Format (PDF)
 - 2. Submittals shall be original PDFs of the document and shall not be created using scanned copies of paper documents.
 - 3. PDF documents shall be searchable.
 - 4. Optical character recognition (OCR) shall be run prior to transmission to ensure all text appears as text and not an image.
 - 5. Electronic submittals shall be separated by specification section and identified as such. Submittals which combine multiple sections into a single document will be rejected.
 - 6. Electronic submittals shall include a table of contents and each applicable section shall be bookmarked for easy access.
 - 7. Electronic submittals shall be clearly marked in RED using boxes and arrows and other appropriate markings to indicate specific product information, option selections, accessories, etc.
 - 8. Include only information relevant to this project in the submittals. Irrelevant or extraneous product information shall be identified and removed from documents prior to submitting.
- C. The Contractor shall incorporate sufficient time for the submittal process in their project schedule. Allow a minimum of (10) business days for submittal review. Time shall begin on the first full business day following receipt of submittals by the engineer and end on date of return of submittals by the engineer. No additional consideration or compensation shall be granted the Contractor due to failure to allow sufficient time in their schedule for the submittal and review process.
- D. Furnish complete shop drawing/catalog data for equipment and materials to be used in the work for review. Allow sufficient time for developing shop drawings, processing, and review time so that the installation will not be delayed.
- E. Shop drawings shall be reviewed, approved, and stamped by the Contractor prior to submitting to Owner's Representative for approval. Submittals without such approval will be returned without review.
- F. Submit data in accordance with Division 01 and in accordance with this section. Data shall be black and white, on 8½×11 inch or 11×17-inch, single, one-sided sheets. Diagrams and drawings larger than 8½×11inch shall be accordion folded to fit in a three-ring binder.
- G. Where choices of options and accessories are available or specified, provide a written description of what is to be furnished. If necessary, list page numbers where submitted items are described.
- H. If material or equipment submitted is not as specified or submittal is not complete, it will be rejected. Only complete submittals including all applicable specification sections will be reviewed.
- I. Catalog data or shop drawings for equipment that are noted as being reviewed shall not supersede Contract Documents.
- J. 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 and specific approval of the deviation has been provided in writing by the owner and the architect, nor shall they relieve this Contractor from responsibility for errors in items submitted.
- K. Check work described by catalog data with Contract Documents for deviations and errors.

PART 3 EXECUTION

3.1 GENERAL

- A. Workmanship shall be of first quality throughout and shall be in complete accordance with the applicable codes.

3.2 SCHEDULING

- A. This Contractor is advised that the work on this project is phased to suit the requirements of the Owner. During construction, it may be necessary to make temporary connections or installations to accommodate the phased nature of the work. Some work may need to be installed and then reinstalled to satisfy the operational requirements of the Owner. Power changeover for existing loads shall be made in the smallest possible increments with branch circuit by branch circuit re-connection required wherever possible.
- B. The controlling issue governing the work described under Division 26 shall be:
DE-ENERGIZING OF ANY FEEDER, SWITCHBOARD, PANEL, BRANCH CIRCUIT OR OTHER EXISTING ELECTRICAL DEVICE OR ITEM SHALL BE AFFECTED ONLY AFTER NOTIFICATION AND SCHEDULING WITH THE OWNER'S PROJECT COORDINATOR.
- C. The Contractor shall prepare written proposed schedules for all systems, feeders, panels, and branch circuits to be de-energized and submit same to the Owner's Project Coordinator fourteen (14) days in advance of the first schedule item for acceptance. Schedules shall include at least the following:
 - 1. Specific load to be de-energized
 - 2. Proposed date and time to be de-energized and re-energized
 - 3. Backup plan should an emergency occur during the outage period (for critical loads)
- D. Schedules proposed by the Contractor are subject to adjustment by the Owner.
- E. The Contractor is advised that the above notification and scheduling requirement may necessitate rescheduling, partial completion and re-connection, overtime work at night or on weekends or delay of the work. Contractor costs incurred due to the above shall be included in the original bid price and shall not be the cause for additional claims or charges to the Owner.

3.3 COORDINATION, INSERTS AND OPENINGS

- A. This installation requires extensive interfacing. It is the responsibility of the Contractor to clarify any questions or discrepancies with the Architect and to ascertain and verify installation conditions about which he is unsure prior to commencing work. Further, during the entire construction period, coordinate, verify and confirm that related work by other trades is done in a manner that will not complicate or compound the electrical system's work.
- B. Locations of devices, outlets, fixtures, equipment, and the like, as shown on the drawings are approximate unless dimensioned. Exact locations of such items shall be determined by the Architect's representative or secured from special details and drawings. The Contractor shall insure that no switches or other electric control devices are mounted such that they are trapped behind open door swings or otherwise rendered inaccessible.
- C. Obtain rough-in and connection dimensions as required for power, control and grounding connections to equipment items that require electrical connection.

- D. Verify the physical dimensions of each item of electrical equipment to fit the available space and promptly notify the Architect/Engineer prior to roughing-in if conflicts appear. Coordination of equipment in the available space and to the access routes through the construction shall be the Contractor's responsibility.
- E. Provide inserts for hangers, brackets, clamps, and the like, as required to support boxes, raceways, cables, fixtures, equipment, etc. Coordinate location and routing to avoid interference with the work of other trades. Method of insert placement shall suit the type of construction into which the inserts are to be installed.
- F. Furnish and install sleeves and block-outs required for openings in the structure needed to install the electrical work. The responsibility for proper placement of sleeves and block-outs shall be with the Contractor.
- G. Openings for electrical work shall be carefully caulked or grouted as required. Spare conduits shall be tightly capped.
- H. All roof and exterior wall penetrations shall be flashed and counter-flashed watertight. Caulking shall be equal to General Electric silicone construction sealants.
- I. Provide access hatches where required for access to junction boxes, electrical equipment, electrical connections, and the like, which require maintenance or access. Coordinate access hatch locations and finish with architect prior to installation. Route and locate all concealed electrical assemblies to minimize the required access hatches.

3.4 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. See Division 01 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. The Contractor shall bear expenses arising from correcting deficiencies in work that do 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 (such as controls) in a dry, heated space.
- E. Notify Owner of equipment delivery dates, twenty-four (24) hours in advance of delivery.
- F. The Contractor shall be responsible for the 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.
- G. 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 an exact paint match.

3.5 PROTECTION AND CLEANING

- A. The Contractor shall provide adequate means for protection and shall fully protect all material and equipment against damage from any causes during the progress of the work and until approval by the Architect.
- B. All material and equipment, both when in storage and during construction, shall be covered in such a manner that no finished surfaces will be damaged, marred or splattered with plaster or paint, and all electrical conductors, buses and connections, electronic components and moving parts shall be kept clean and dry.
- C. All damaged material or equipment, including face plates of panels and switchboard sections, shall be replaced, or refinished by the manufacturer at no additional expense to the Owner.
- D. During the progress of the work, the Contractor shall clean up after their workers and shall leave the premises and all portions of the building in which he is working free from their debris.
- E. Provide and maintain suitable barriers, protective devices, lights, and warning signs where required for protection of the public and employees about the building and site.

3.6 PAINTING

- A. No painting is included in Division 26 except as specifically indicated.
- B. Where exposed electrical raceways and equipment are to be painted, schedule work to ensure that such electrical items are installed prior to painting or that items installed afterward are painted later to match the original finishes.
- C. Protect latches on panelboard covers, wiring devices, device faceplates, clocks, and other electrical devices against accidental painting.
- D. Protect nameplates and labels on electrical equipment from being obscured by paint.

3.7 VISITING THE PROJECT SITE

- A. Examine premises and understand the conditions that may affect the 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.

3.8 TESTS

- A. See individual specification sections for Testing Requirements.

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Operation and Maintenance Manual
- B. Operation and Maintenance Training/Startup
- C. Spare Parts/Maintenance Materials
- D. Warranties
- E. Final Cleaning
- F. Record Drawings
- G. Punch List Procedures
- H. Maintenance Services

1.2 RELATED SECTIONS

- A. Refer to Division 01- Contract Closeout
- B. Section 26 01 01 - Basic Electrical Requirements

1.3 OPERATION AND MAINTENANCE MANUAL

- A. Bind final copies of the Operation and Maintenance Manual for Electrical Systems in a black three-post, hard-backed binder imprinted in gold lettering with the job title, date, Engineer, Architect and Contractor names. The work shall be done in a print shop or bindery.
 - 1. Provide a master index at the beginning of the Manual showing items included. Use plastic index tabs for the end section of the Manual.
 - 2. First section shall consist of name, address, and phone number of Architect, Mechanical and Electrical Engineers, General Contractor, and Electrical Contractors.
 - 3. Provide a separate section for each section of the specifications. Provide an index for each section listing equipment included.
- B. Product literature, catalog cuts, etc. shall be clean copies. FAX or other poor-quality prints will not be acceptable.
- C. Submit one (1) electronic copy of Operation and Maintenance Manual to Owner's Representative for review. After this review and final approval of the manuals, prepare two (2) hard copies of approved manuals for use during the instruction period. Following the instruction period, turn over both copies to the Owner.
- D. In general, the following shall be included in the Operation and Maintenance Manual for each electrical equipment item:

1. List of electrical equipment used to indicate name, model, serial number, and name plate data of each item together with number and name associated with each system item as indicated on the drawings.
 2. Manufacturer's maintenance instructions: Instructions shall include name of vendor, installation instructions, parts numbers and lists, operation instructions of equipment, and maintenance and lubrication instructions.
 3. Step-by-step procedure to follow in putting each piece of electrical equipment into operation
 4. Wiring diagram for each specific equipment item
 5. Refer to individual specification sections for additional information required to be incorporated into the Operation and Maintenance Manual.
- E. Include the following additional items in the O&M Manual:
1. Summary list of spare equipment parts furnished under this contract
 2. Test Records of feeders, transformers, circuit breakers, telephone/data wiring, etc.
 3. Signed checklist of Instruction Period
 4. Copies of specific product Warranties.
 5. Electrical identification schedules
 6. Copies of manual describing specific maintenance services that will be furnished

1.4 OPERATION AND MAINTENANCE TRAINING/STARTUP

- A. Upon completion of the work, the Contractor shall assemble the Electrical Systems Installer and any subcontractors together with factory representatives for system start-up and demonstration. These people shall assist in start-up and check out each system and remain at the site until the total electrical system operation is acceptable and understood by the Owner's designated maintenance and/or operation personnel. The Electrical System Installer or a subcontractor or factory representative designated by them shall also give personal instructions on operation and maintenance of the electrical equipment to the Owner's maintenance and/or operation personnel.
- B. To prove acceptance of operation and instruction by the Owner's representative, the Contractor shall prepare a written statement of approval detailing it for their signature. The statement shall be as follows:

"I, the Contractor, together with the Electrical Systems Installer and the associated factory representatives, have started each system and the total electrical system, and have demonstrated their normal operation to the Owner's representative and have instructed them in the operation and maintenance thereof."

 Owner's Representative

 Contractor

Electrical System	Demonstrated By/Witnessed By	Instruction Time Allotment	Date
26 24 16 - Panelboards	/	2.0 hours	
Demonstrate Operation and Instruct Owner in Maintenance of General Electrical System	/	2.0 hours	
Written Guarantee Received	/		
O&M Manuals Received	/		
As-Built Drawings Received	/		

1.5 SPARE PARTS/MAINTENANCE MATERIALS

- A. Provide a summarized list of spare parts that are to be furnished. Incorporate into O&M Manual.
- B. Refer to individual specification sections for spare parts to be furnished under this contract.
- C. Turn spare parts and materials over to the Owner and get a signed receipt documenting delivery of spare parts.

1.6 WARRANTIES/GUARANTEES

- A. The Contractor shall guarantee all work to be free from defects in material and workmanship for a period of one (1) year. See General Conditions for beginning of guarantee period. The Contractor shall make good at their own expense all defects in their work and/or equipment furnished by them, which shall develop at any time during the one (1) year guarantee period and shall stand any expense of cutting and patching and repairing made necessary to correct unsatisfactory work or equipment operation.
- B. Exceptions - incandescent lamps shall be guaranteed for a period of one month.
- C. The manufacturer's warrantee certificates shall be included in the Operation & Maintenance Manuals for equipment that is warranted by the manufacturer for a period greater than one year.

1.7 CLEAN-UP

- A. Clean up all equipment, materials, cartons, and other debris that is a direct result of the installation of equipment under this contract.
- B. Clean exposed conduits, equipment, and fixtures. Repair damaged finishes and leave everything in working order.
- C. Remove stickers and residue from fixtures and electrical equipment.
- D. Remove debris and vacuum dust out of all panels, switchboards and other equipment and enclosures installed or modified under this project.

1.8 RECORD DRAWINGS

- A. Record differences between electrical work as installed and as shown in Contract Documents, on a set of prints of electrical drawings to be furnished by Owner's Representative. Return these prints to Owner's Representative at completion of Project. Notations made on drawings shall be neat and legible and made using **RED** ink. These drawings shall not be used for any other purposes.
- B. Refer to individual specification sections for additional requirements.

1.9 PUNCH LIST PROCEDURES

- A. The Contractor shall notify the Owner's Representative in writing when the project is ready for punch lists. After punch lists are complete, written notice must be forwarded to the Owner's Representative requesting final checkout. Any additional trips by the Engineer to the site for punch list verification that

become necessary due to items on previous punch lists that have not been completed at the time of the final checkout will be billed to the Contractor at normal rate plus travel expenses.

- B. At the time of punch list and final project checkout, the project foreman shall accompany the Engineer and remove cover plates, panel covers and other access panels to allow complete review of the entire electrical systems.

1.10 MAINTENANCE SERVICES

- A. Provide separate manual describing specific maintenance services to be provided as required under specific specification sections.

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Remodel construction in existing occupied buildings
- B. Demolition and salvage within existing buildings

1.2 RELATED SECTIONS

- A. Division 01 - Alteration Project Procedures
- B. Division 02 - Minor Demolition for Remodeling
- C. Reference Section 26 01 01

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

- A. Materials and equipment for patching and extending work: As specified in individual Sections.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify field measurements and circuiting arrangements are as shown on drawings.
- B. Verify that abandoned wiring and equipment serve only abandoned facilities.
- C. Demolition drawings are based on casual field observation and existing record documents. Report discrepancies to the Architect/Engineer before disturbing existing installation.
- D. Beginning of demolition means installer accepts existing conditions.

3.2 PREPARATION

- A. Coordinate utility service outages with Utility Company.
- B. Provide temporary wiring and connections to maintain existing systems in service during construction. When the work must be performed on energized equipment or circuits, use personnel experienced in such operations.
- C. Existing Electrical Service: Maintain existing system in service until new system is complete and ready for service. Disable the system only to make switchovers and connections. Reference Section 26 01 01 - Scheduling. Make temporary connections to maintain service in areas adjacent to work area.

3.3 DEMOLITION OF EXISTING ELECTRICAL WORK

- A. Remove existing electrical equipment including switchgear, panels, and disconnect devices, conduit, and wiring, unless specifically indicated to remain. Completely remove such equipment from the site and properly dispose of it, unless specifically instructed otherwise.
- B. Remove conduit as required to accommodate work of other trades. The Contractor may reuse the remaining existing branch circuit conduits to the extent possible. Provide proper support and bonding.
- C. Remove inactive and abandoned raceways except raceways embedded in floors and walls, and raceways completely concealed above ceilings, may remain if such materials do not interfere with new installations.
- D. Remove inactive and abandoned wire including disconnected circuits and circuits from all terminal devices or loads removed under this project.
- E. Patch and repair finishes to match existing finishes for all openings left in existing construction by removal of existing equipment.
- F. If during demolition, existing active services are encountered they shall be relocated as required to accommodate the remodeling. The continuity of said services shall always be maintained, except as provided under Section 26 01 01 - Scheduling.

3.4 RELOCATION OF EXISTING EQUIPMENT

- A. Relocate existing electrical equipment as indicated on the drawings. Equipment to be relocated shall be serviced and repaired as necessary to place in good working order and to the satisfaction of the Architect/Engineer. Relocated equipment shall be disconnected and completely reconnected to required services at the new location.
- B. Cap off and abandon or remove existing services as required when existing equipment is disconnected or removed.

3.5 EXISTING UTILITIES AND PIPING

- A. 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 10 foot 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 their own expense.

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Building wire and cable
- B. Wiring connectors and connections

1.2 RELATED SECTIONS

- A. Section 26 05 53 - Electrical Identification

1.3 REFERENCES

- A. NECA Standard of Installation (National Electrical Contractors Association)
- B. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems (International Electrical Testing Association)
- C. NFPA 70 - National Electrical Code

1.4 SUBMITTALS FOR REVIEW

- A. Product Data: Submit information covering every type of wire or cable to be provided on the project.

1.5 PROJECT CONDITIONS

- A. Verify that field measurements are as indicated.
- B. Conductor sizes are based on copper
- C. Wire and cable routing indicated is approximate unless dimensioned.

1.6 COORDINATION

- A. Where wire and cable destination is indicated and routing is not shown, determine exact routing and lengths required.

PART 2 PRODUCTS

2.1 BUILDING WIRE

- A. Manufacturers: Conductors shall be as manufactured by:
 - 1. Southwire
 - 2. Cerro
 - 3. Encore
 - 4. Superior Essex
 - 5. Houston
 - 6. Approved equal

- B. Wire and cable shall be COPPER single conductor type with 600-volt insulation, unless otherwise indicated.
- C. Copper conductors shall be soft drawn, minimum 98 % conductivity.
- D. Grounding conductors shall be copper in all cases, no exceptions.
- E. #12 and smaller wire shall be solid with type TW, THW or THWN insulation. Larger wire shall be stranded with type THW or THWN insulation.
- F. Outer jackets of conductors shall be color coded as follows:
 - 1. 120/208-volt circuits.
 - a. Phase A-Black
 - b. Phase B-Red
 - c. Phase C-Blue
 - d. Neutral-White
 - 2. Insulated ground wires-Green.
 - 3. On large conductors, for which color-coded jackets are not available, install bands of adhesive non-fading colored tape or slip-on bands of colored plastic tubing over the cables and wires at their terminations and in the vaults, wireways, junction boxes and outlet boxes. In vaults and wireways, install the color coding at each end of the wireway and at approximately 3 foot intervals within the vault or wireway.
 - 4. Materials used for identification shall be colorfast and shall withstand cleaning. Colors used shall be the same as specified for outer jackets.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that the interior of building has been protected from weather.
- B. Verify that mechanical work likely to damage wire and cable has been completed.
- C. Verify that the raceway installation is complete and supported.

3.2 INSTALLATION IN RACEWAYS

- A. Wire and cable shall be run in metal raceways, except where plastic conduit has been specifically approved. Pull all conductors into the raceway at same time.
- B. Branch circuit runs are shown schematically. Except where exact routing is indicated, branch circuit home runs may be grouped, and the actual routing of branch circuit conduits may be determined at the site and properly entered on the As-built drawings.
- C. Use solid conductor for feeders and branch circuits 12 AWG and smaller.
- D. Use stranded conductors for control circuits.
- E. Use conductor not smaller than 12 AWG for power and lighting circuits.
- F. Use conductor not smaller than 14 AWG for signal and control circuits, except as indicated.

- G. Use 10 AWG conductors for the entire length of the branch circuit for 20-ampere, 120-volt branch circuits longer than 75 feet.
- H. Use 10 AWG conductors for all exterior lighting circuits.
- I. Isolated Power System conductors shall not be installed in shared raceway systems with conductors of another Isolated Power System or conductors of any other system.
- J. Use suitable wire pulling lubricant for building wire 4 AWG and larger.
- K. Train and neatly lace wiring inside boxes, equipment, and panelboards.
- L. Where more than three current carrying conductors are installed in a single raceway, the minimum wire size shall be increased to provide allowable load current of 100 % of the overcurrent device in accordance with National Electrical Code, Article 310.
- M. All splices shall be made in properly sized junction/pull boxes.
- N. Service entrance and feeder conductors shall be installed without splices.
- O. Except where sizes are indicated on the drawings, the following schedule shall be adhered to:

Circuit Overcurrent Device Rating	Conductor Sizes
20 amperes or less	#12
25 or 30 amperes	#10
35 or 40 amperes	#8
45 or 50 amperes	#6
60 or 70 amperes	#4
80 or 90 amperes	#2
100 or 110 amperes	#1
125 or 150 amperes	#1/0

- P. Where ambient temperatures are within 50 °F of the maximum allowable operating temperatures of the insulation of a conductor, provide conductors with insulation of higher temperature rating suitable for the temperature to be encountered.
- Q. Identify and color code all wire, and cable as specified above. Identify each conductor with its circuit number or other designation indicated.

3.3 WIRING CONNECTIONS AND TERMINATIONS

The use of wire nuts is restricted to splices in wire #8 and smaller and shall be made with Scotchlok™ or approved equal. Splices made in conductors larger than #8 shall be made with pre-insulated tap connectors as manufactured by Polaris, ILSCO or NSI industries. Use of split-bolt type connections is not permitted.

Wire nuts and splice kits shall be UL listed as suitable for the specific location installed.

- A. Clean conductor surfaces before installing lugs and connectors.

- B. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.
- C. Re-tighten all bolt type connections twenty-four (24) to forty-eight (48) hours after installation and before taping. All bolt type connections to busbars shall employ spring loaded Belleville washers.
- D. Prior to termination all exposed surfaces of aluminum conductors shall be cleaned with a wire brush to remove oxide film and coated with an oxide-inhibiting compound. Special care shall be taken to prevent moisture from entering between the strands of exposed conductor ends.
- E. Connections and terminations of aluminum wire shall be made only with lugs listed for use with aluminum conductors.
- F. All cables shall extend between outlets with complete electrical continuity and without any shorts or grounds. Cables shall be uninterrupted and un-spliced.
- G. Cables shall be routed to maintain a separation of at least 2 feet from all heat sources and from ballasts, transformers, dimmers, and all other sources of electromagnetic interference. Avoid cables in areas where they may be damaged because of normal use of the area.
- H. Cable run in ceiling cavities shall not lie upon the ceiling or be supported from ceiling suspension wires or from conduits or pipes but shall be suspended from the building structural elements using cable ties.
- I. Care shall be exercised during installation not to damage the cable insulation. Damaged cables shall be removed and replaced.
- J. Stranded conductors shall not be connected directly to wiring devices. Where such connections are to be made, insulated solid copper wire "tails" shall be spliced to the stranded conductors in the outlet box.
- K. The contractor is responsible for terminations of all feeders, branch circuits, conductors and other wiring to the indicated equipment or device shown in the project documents. Where the conductor size is greater than the equipment lugs or termination device can accommodate, furnish, and install reducing connectors, lug adapters, pigtail adapters, splice blocks, additional junction boxes, gutters and wireways, etc. as required to terminate indicated feeders, branch circuits, conductors, and other wiring to buses, breakers, and other equipment.

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Electrical connections to equipment

1.2 RELATED SECTIONS

- A. Section 26 05 19 - Building Wire and Cable
- B. Section 26 05 30 - Conduit
- C. Section 26 05 32 - Boxes

1.3 REFERENCES

- A. NEMA WD 1 - General Purpose Wiring Devices
- B. NEMA WD 6 - Wiring Devices - Dimensional Requirements
- C. NFPA 70 - National Electrical Code

1.4 SUBMITTALS FOR REVIEW

- A. Product Data: Provide wiring device manufacturer's catalog information showing dimensions, configurations, and construction.

1.5 REGULATORY REQUIREMENTS

- A. Conform to requirements of NFPA 70.
- B. Products: Listed and classified by Underwriters Laboratories, Inc. as suitable for the purpose specified and indicated.

1.6 COORDINATION

- A. Obtain and review shop drawings, product data, manufacturer's wiring diagrams, and manufacturer's instructions for equipment furnished under other sections.
- B. Determine connection locations and requirements.
- C. Sequence rough-in of electrical connections to coordinate with installation of equipment.
- D. Sequence electrical connections to coordinate with start-up of equipment.

PART 2 PRODUCTS

2.1 CORDS AND CAPS

- A. Manufacturers:
 - 1. Arrow-Hart
 - 2. Bryant
 - 3. Leviton
 - 4. Hubbell
 - 5. Pass & Seymour
 - 6. Or Approved Equal
- B. Attachment Plug Construction: Conform to NEMA WD 1.
- C. Configuration: NEMA WD 6, UL 498, heavy duty nylon construction with external cord clamp and dead-front construction, with rating and NEMA configuration molded on the device. Match receptacle configuration at outlet provided for equipment.
- D. Cord Construction: NFPA 70, Type SO multi-conductor flexible cord with identified equipment grounding conductor, suitable for use in damp locations.
- E. Size: Suitable for connected load of equipment, length of cord, and rating of branch circuit overcurrent protection.

- 2.2 VARIABLE FREQUENCY DRIVES Variable Frequency Drives (VFD's) are furnished by Division 23 and/or Division 22 and installed by Division 26. Refer to mechanical drawings for details.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that equipment is ready for electrical connection, wiring, and energization.

3.2 ELECTRICAL CONNECTIONS

- A. Make electrical connections in accordance with equipment manufacturer's instructions.
- B. Make conduit connections to equipment using flexible conduit. Use liquid-tight flexible conduit with watertight connectors in damp or wet locations.
- C. Connect heat producing equipment using wire and cable with insulation suitable for temperatures encountered.
- D. Provide receptacle outlet to accommodate connection with attachment plug.
- E. Provide cord and cap where field-supplied attachment plug is required.
- F. Install suitable strain-relief clamps and fittings for cord connections at outlet boxes and equipment connection boxes.

- G. Install disconnect switches, controllers, control stations, and control devices to complete equipment wiring requirements.
- H. Install terminal block jumpers to complete equipment wiring requirements.
- I. Install interconnecting conduit and wiring between devices and equipment to complete equipment wiring requirements.
- J. Provide final connection of all equipment items as scheduled. Coordinate work with the equipment supplier/installer.
- K. Obtain dimensioned shop drawings from the equipment suppliers prior to rough-in of branch circuits.
- L. Where equipment requires a cord connection, install a new cord and cap if the one furnished does not match the receptacle provided.
- M. Circuit breaker, feeder and fuse sizes shall be coordinated with the nameplate data on the actual equipment furnished.
- N. Provide disconnecting safety switches for all mechanical equipment and for permanently connected motors larger than 1/8 Hp unless the connected equipment is complete with an approved disconnecting means or is adjacent to another approved means of disconnect for the circuit. Disconnection devices shall be fusible safety switches except where manual motor starters or toggle switches are indicated on the plans. Provide fused safety switches with the appropriate type and size of fuses.
- O. Motor and starter wiring shall be done in complete accordance with wiring diagrams provided by the supplier.
- P. Check the rotation of all three phase motors and reconnect same where necessary to provide the proper direction of rotation as required for the driven unit. Check all motor starters for properly sized overload relays and properly sized heaters.
- Q. Provide all required relays, wiring and equipment required for fire alarm fan shutdown. Interconnecting controls shall be rated to match starter control voltage.
- R. Receptacles and outlet boxes for electric water coolers shall be concealed within the water cooler enclosure.
- S. The contractor is responsible for terminations of all feeders, branch circuits, conductors and other wiring to the indicated equipment or device shown in the project documents. Where the conductor size is greater than the equipment lugs or termination device can accommodate, furnish, and install reducing connectors, lug adapters, pigtail adapters, splice blocks, additional junction boxes, gutters and wireways, etc. as required to terminate indicated feeders, branch circuits, conductors, and other wiring to buses, breakers, and other equipment.

3.3 AIR HANDLER UNIT AND SIMILAR MECHANICAL EQUIPMENT

- A. The number of connection points for AHU and similar mechanical equipment lighting and accessory circuits varies with multiple switches and manufacturer provided lighting fixtures. Extend circuit as required and coordinate installation with Division 23. Provide toggle switch for AHU lights where not included with the unit.

3.4 VARIABLE FREQUENCY DRIVES For all equipment with VFD(s) provide contacts & relays as required to interlock disconnects with VFD(s) to signal VFD when disconnect is open.

3.5 GAS FIRED EQUIPMENT

- A. Boiler shutdown switch. A shutdown switch is required at each egress from rooms containing gas-fired equipment. Switch(s) are furnished and installed by Division 26. Switches shall be as manufactured by Safety Technology International model SS2079PO-EN or approved equal. Switch shall include (1) set of normally open and (1) set of normally closed contacts. Provide 3/4"C and (2) #14AWG wires from the switch to the boiler(s) for shutdown circuit. Coordinate with Division 23 for details. See Section 23 09 23 specifications.

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Grounding conductors
- B. Equipment grounding conductors
- C. Bonding

1.2 REFERENCES

- A. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems (International Electrical Testing Association)
- B. NFPA 70 - National Electrical Code
- C. UL 467 - Grounding and Bonding Equipment
- D. IEEE 142 - Recommended Practice for Grounding of Industrial and Commercial Power Systems

1.3 SUBMITTALS FOR REVIEW

- A. Submit under provisions of Section 26 01 01.
- B. Product Data: Provide data for grounding electrodes and connections, installation details, dimensioned plan view drawings of the buildings showing the grounding system, and criteria for system test and acceptance. At a minimum, said drawings shall show the type and location of all conductors, fasteners, splices and connectors, and all ground terminals. Submittal shall include design criteria and calculations for any deviations from these specifications.
- C. Submit documentation of grounding system installation as described in this specification. Engineer approval of grounding system installation through the submittal process is required for substantial completion.

1.4 PROJECT FINALIZATION

- A. Submit under provisions of Section 26 01 02.
- B. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, installation instructions, maintenance and repair data, and parts listing.
- C. Warranty: Submit manufacturer's warranty and ensure forms have been completed including the Owner's name and registered with the manufacturer.

1.5 OPERATION AND MAINTENANCE DATA

- A. Division 01 - Contract Closeout: Division 01 - Operation and Maintenance Data: Division 01 - Warranties: Procedures for submittals

- B. Project Record Documents: Record actual locations of components and grounding electrodes.
- C. Certificate of Compliance: Indicate approval of installation by authority having jurisdiction.

1.6 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Product: Listed and classified by Underwriters Laboratories, Inc. as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.1 CONNECTORS

- A. Materials: Fasteners:
- B. Splices and connectors shall be of the irreversible crimp type.
- C. Splices and connectors shall be specifically designed for the application and the materials to be spliced.
- D. Manufacturers:
- E. Cable Connectors: Burndy Hyground, T&B Blackburn and Harger or equal.
- F. Pipe Clamp Connectors: Thompson Lightning Protection, Inc. Models #803, #804, and #805, or equal.
- G. Rebar Clamps: As manufactured by Burndy Hyground, T&B Blackburn and Harger or equal.
- H. Grounding Rod Clamps: As manufactured by Burndy Hyground, T&B Blackburn and Harger or equal.

2.2 EXOTHERMIC CONNECTIONS

- A. Exothermic fusion welds are not permissible unless indicated otherwise.

2.3 WIRE

- A. Material: Stranded copper
- B. System grounding electrode conductors and bonding conductors shall be stranded-type single conductors, with 600-volt insulation, sized to meet NFPA 70 requirements, as manufactured by General Cable, Rome, Southwire, or Triangle.
- C. Bonding conductors, except rebar bonding conductors at ground terminals, shall be cable assemblies of 14 strands of 17 AWG copper wire assembled in a braided smooth twist resulting in ¼ inch diameter cable of 28,500 circular mil cross-sections with a net weight of 92 pounds per 1000 linear feet.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that final back fill and compaction has been performed before driving rod electrodes.

3.2 GENERAL

- A. Grounding conductors shall be **COPPER** in all cases - no exceptions.
- B. Bond all anchor bolts at the base of every structural steel column throughout the facility to the reinforcing bar in the foundation or footing by means of a bonding conductor. This requirement shall not apply to existing columns in existing parts of the facility.
- C. Ground all interior metallic plumbing lines to the premises grounding electrode system in accordance with local codes. Maintain continuity of the ground across isolating (dielectric) fittings in the following manner:
 - 1. Provide brass, saddle type, two (2) bolt grounding clamp on the pipe on each side of the isolating fitting.
 - 2. Provide a green insulated #6 AWG TW solid copper conductor connecting the two (2) grounding clamps together.

3.3 SERVICE GROUNDING

- A. Ground the neutral of the secondary electrical system at the service equipment. A grounding electrode system shall be formed by bonding to metallic water lines and foundation reinforcing bars. In addition, the metal frame of the building, where applicable, shall be bonded to the grounding electrode system. Grounding connections made to the water systems shall be coordinated with the Mechanical Contractor and bonding jumpers shall be installed wherever deemed necessary.
- B. Where the metallic water lines or the foundation reinforcing bars are not suitable for use as grounding electrodes as controlled by local requirements, provide multiple copper-clad ground rods. A minimum of four (4) ground rods shall be provided and shall be connected in a loop in such instances. Do not abandon the ground connection to the cold-water system even if it is not to be used as the primary grounding electrode.
- C. The secondary electrical system ground shall consist of copper grounding electrode conductors, sized per the drawings, and installed in a rigid steel conduit which shall be routed to the system grounding electrodes in the most direct manner. Connect the conduit and the conductor to the grounding electrode with a malleable iron conduit hub and a two-bolt ground clamp approved for the purpose.

3.4 DISTRIBUTION GROUNDING

- A. Provide grounding electrodes and grounding electrode conductors for separately-derived electrical systems, including dry-type transformers. Ground the neutral of each separately-derived electrical system. Bond the grounding electrodes for each separately-derived system to the premises grounding electrode system.
- B. Use the conduit system for equipment and enclosure bonding. If this is not possible due to the use of non-metallic conduit for portions of the work, provide a green insulated equipment grounding conductor of code size. If conduits require an increase in size to accommodate this conductor, the entire run shall likewise be increased in size.

- C. Where a conduit enters the enclosure of a switchboard, motor control center or transformer from below, provide an insulated-throat grounding bushing on the conduit and a bonding jumper connecting it to the ground bus and metal frame of the equipment.
- D. Where a conduit enters a painted sheet metal enclosure, the paint shall be cleaned from the area around the locknut to allow metal-to-metal contact or a grounding locknut shall be used.
- E. Provide a redundant equipment grounding conductor together with each feeder run in addition to the conduit system grounding path.
- F. Provide a redundant equipment grounding conductor, in addition to the conduit system ground path and in addition to the phase and neutral conductors shown on the plans, in each branch circuit conduit which supplies receptacles, lights or fixed electrical equipment. An additional isolated ground conductor shall be provided where indicated in the drawings.
- G. Provide a copper equipment grounding terminal bar in all panelboards, new or existing, where equipment grounding conductors terminate, bonded to a grounding bushing on the conduit feeding the panelboard.
- H. Provide separate grounding conductors at motor connections, transformer connections, and where flexible or non-metallic conduit is used.
- I. Connect the ground terminal on each receptacle to the metallic raceway system with a bonding jumper, except in the case of surge-suppression or isolated-ground type receptacles. The ground terminal of surge-suppression or isolated-ground type receptacles shall be connected to an insulated equipment grounding conductor run with the branch circuit conductors, but isolated from the conduit system except at the panelboard, where it shall be connected to the panelboard ground bus. Maintain continuity of the ground to every outlet in the system.
- J. Metal frames in rooms likely to accumulate water on the floor shall be bonded to the electrical system ground with a green insulated #10 AWG (minimum) grounding conductor, routed in conduit and bonded to the conduit at each end.

3.5 DOCUMENTATION

- A. The contractor shall perform the following inspections and documentation of the grounding system prior to covering up connections:
 - 1. After installation and prior to covering connections, photograph the entire grounding system installation. Include close-up photos to document critical system connection points.
 - 2. Mark-up a set of drawings in PDF to indicate the photograph number and location of the photo for reference. Photographs shall be numbered and neatly assembled in a PDF or similar document having not more than (2) photographs per page. Submit this document to the engineer for review and approval. Approval of this submittal is required for substantial completion. Include this documentation along with the photographic record in the project O&M manuals.

3.6 TESTING

- A. After installation, fully evaluate the grounding electrode systems for system conductivity and ground terminal resistance-to-earth.
- B. Tests shall be performed using the three-point fall of potential test method and suitable test equipment in accordance with IEEE Standard 81 and other applicable standards.

- C. Include the test report in the Operation and Maintenance Manual.

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Metal conduit
- B. Flexible metal conduit
- C. Electrical metallic tubing
- D. Fittings and conduit bodies

1.2 RELATED SECTIONS

- A. Division 07 - Fire Stopping
- B. Section 26 05 26 - Grounding and Bonding
- C. Section 26 05 32 - Boxes
- D. Section 26 05 53 - Electrical Identification
- E. Section 26 27 27 - Supporting Devices

1.3 REFERENCES

- A. ANSI C80.1 - Rigid Steel Conduit, Zinc Coated
- B. ANSI C80.3 - Electrical Metallic Tubing, Zinc Coated
- C. ANSI/NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies
- D. ANSI/NFPA 70 - National Electrical Code
- E. NECA "Standard of Installation"
- F. NEMA RN 1 - Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit
- G. NEMA TC 2 - Electrical Plastic Tubing (EPT) and Conduit (EPC-40 and EPC-80)
- H. NEMA TC 3 - PVC Fittings for Use with Rigid PVC Conduit and Tubing

1.4 DESIGN REQUIREMENTS

- A. Conduit Size: ANSI/NFPA 70

1.5 SUBMITTALS

- A. Product Data: Provide data for metallic conduit, flexible metal conduit fittings, conduit bodies, and fire sealants.

1.6 PROJECT RECORD DOCUMENTS

- A. Submit under provisions of Division 01.
- B. Accurately record actual routing of conduits larger than 1 inch.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect, and handle Products to site under provisions of Section 26 01 01.
- B. Accept conduit on site. Inspect for damage.
- C. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.
- D. Protect PVC conduit from sunlight.

1.8 PROJECT CONDITIONS

- A. Verify that field measurements are as shown on drawings.
- B. Verify routing and termination locations of conduit prior to rough-in.
- C. Conduit routing is shown on drawings in approximate locations unless dimensioned. Route as required to complete the wiring system.

PART 2 PRODUCTS

2.1 METAL CONDUIT

- A. Manufacturers:
 - 1. Allied Tube and Conduit
 - 2. Republic Conduit
 - 3. Western Tube and Conduit
 - 4. Wheatland Tube
 - 5. Approved Equal
- B. Rigid Steel Conduit: ANSI C80.1
- C. Intermediate Metal Conduit (IMC): Rigid steel
- D. Fittings and Conduit Bodies: ANSI/NEMA FB 1; Threaded galvanized or cadmium plated steel fittings. Bushings shall have nylon insulated throats

2.2 FLEXIBLE METAL CONDUIT

- A. Manufacturers:
 - 1. AFC
 - 2. Anamet
 - 3. Southwire
 - 4. Approved Equal
- B. Description: Interlocked, galvanized steel construction
- C. Fittings: ANSI/NEMA FB 1: Specifically designed for the purpose

2.3 ELECTRICAL METALLIC TUBING (EMT)

- A. Manufacturers:
 - 1. Allied Tube and Conduit
 - 2. Republic Conduit
 - 3. Western Tube and Conduit
 - 4. Wheatland Tube
 - 5. Approved Equal
- B. Description: ANSI C80.3; galvanized tubing
- C. Fittings and Conduit Bodies: ANSI/NEMA FB 1; steel, set screw for indoor locations and rain tight compression type with nylon insulated throats on connectors for outdoor locations.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Feeder conduit types shall be as follows:
 - 1. Rigid metal conduit for exposed, underground or under slab runs.
 - 2. Intermediate metal conduit in walls, above ceilings, in poured concrete or in masonry, except for runs in hazardous locations.
 - 3. Electrical metallic tubing with separate ground wire in non-masonry/concrete walls or above ceilings, except for runs in hazardous locations.
 - 4. Rigid nonmetallic conduit with a separate ground wire for underground or under slab on grade runs, except runs in hazardous locations.
- B. Branch circuit conduit types shall be as follows:
 - 1. Rigid metal conduit for exposed runs up to 4 feet 6 inches above the finished floor in sheltered spaces, for all exposed runs subject to the weather, for runs in hazardous locations and for underground or under slab runs.
 - 2. Intermediate metal conduit in walls, above ceilings, in poured concrete or in masonry, except runs in hazardous locations.
 - 3. Electrical metallic tubing in non-masonry/concrete walls or above ceilings, and for exposed runs more than 4 feet 6 inches above the finished floor in sheltered spaces, except runs in hazardous locations.
 - 4. Flexible steel conduit for connections to transformers, motors, and other vibrating equipment in dry, sheltered areas.

- C. Conduits shall be sized in accordance with the applicable codes except where larger conduits are called for on drawings. Sizes shown on the drawings are based on the use of rigid metal conduit and copper conductors with THW insulation unless noted otherwise.
- D. Do not install conduit in poured concrete or masonry walls or slabs without the Architect's approval.
- E. Rigid conduit and IMC shall be reamed after threads are cut. Joints shall be cut square and shall butt solidly into couplings. Running threads will not be permitted. The cut ends of EMT shall also be reamed.
- F. Bends in rigid conduit, IMC and EMT runs larger than 1¼ inch shall be of factory-made elbows unless otherwise specifically approved. Bends in 1¼ inch and 1 inch runs shall be made in an approved bending machine (or factory made). Hickey bends will not be permitted in conduits larger than ¾ inch. Bends shall not show flattening.
- G. The radius of the inner edge curve of any field bend shall not be less than indicated in the following table:

Conduit Size (inches)	Inside Radius (inches)
½	4
¾	5
1	6
1¼	8
1½	10
2	12
2½	15
3	18
3½	21
4	24

- H. Where conduit runs are 100 feet or longer or contain the equivalent of four (4) 90-degree bends, pull/junction boxes shall be provided. Pull box locations shall be indicated on the as-built drawings.
- I. Provide a #12 AWG copper pull wire or a polyethylene pull rope rated at 250 pounds (minimum) tensile strength in each conduit left empty for future use.
- J. Conduits containing innerducts shall consist of a four-inch PVC Schedule 40 outer conduit (underground) or RGS (above ground or indoors), with three 1¼ inch ribbed polyethylene innerducts. Install all innerducts at once without crushing or kinking.
- K. Ground and bond conduit under provisions of Section 26 05 26.
- L. Identify conduit under provisions of Section 26 05 53.
- M. Branch circuit runs are shown schematically. Except where exact routing is indicated, branch circuit home runs may be grouped, and the actual routing of branch circuit conduits may be determined at the site and properly entered on the As-built drawings.

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Wall and ceiling outlet boxes
- B. Pull and junction boxes

1.2 RELATED SECTIONS

- A. Division 07 - Firestopping
- B. Section 26 05 30 - Conduit

1.3 REFERENCES

- A. NECA - Standard of Installation
- B. NEMA FB 1 - Fittings and Supports for Conduit and Cable Assemblies
- C. NEMA OS 1 - Sheet-steel Outlet Boxes, Device Boxes, Covers, and Box Supports
- D. NEMA OS 2 - Non-metallic Outlet Boxes, Device Boxes, Covers and Box Supports
- E. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum)
- F. NFPA 70 - National Electrical Code

1.4 SUBMITTALS

- A. Product Data: Provide data for wall and ceiling outlet boxes, floor boxes, pull, and junction boxes.
- B. Record actual locations and mounting heights of outlet, pull, and junction boxes on project record documents.

1.5 REGULATORY REQUIREMENTS

- A. Provide Products listed and classified by Underwriters Laboratories, Inc., as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.1 OUTLET BOXES

- A. Manufacturers:
 - 1. Appleton
 - 2. Crouse Hinds
 - 3. Killark
 - 4. O Z Gedney

5. Raco/Bell
 6. Steel City
 7. Approved equal
- B. Boxes shall accommodate the devices to be installed and shall be sized as required by the applicable codes for number and size of conduits and conductors entering and leaving. Round or octagon boxes will not be permitted unless specifically called for. Boxes shall have galvanized finish.
- C. Boxes shall be of code gauge steel and provided with plaster, tile, or other appropriate device rings.
- D. Outlet boxes and device boxes mounted in non-masonry walls shall be minimum 4 inches square by 1½ inches deep exclusive of rings and shall be provided with covers or device rings as specified. Boxes for wall switches and outlets shall be minimum 2 1/8 inches deep exclusive of rings.
- E. Outlet boxes, telephone/data boxes, and device boxes mounted in masonry walls shall be double gang masonry boxes with a minimum depth of 2½ inches for 4 inch masonry walls and 3½ inches for 6 inch or 8 inch masonry walls (exclusive of rings).
- F. Multi-gang boxes shall be one-piece. Do not use built-up boxes.
- G. Weatherproof boxes shall be non-rusting cast metal with threaded hubs. Boxes shall have screw mounted, gasketed covers. Plugs shall be installed in all unused holes.
- H. Outlet boxes installed on existing poured concrete or masonry walls in detention areas shall be triple coated, malleable iron cast boxes equal to Appleton FS/FD series. Where the conduit is surface mounted to the box, provide cast hubs, otherwise, provide a blank body capable of being drilled and tapped at back of box.
- I. Boxes installed in masonry walls shall have tile covers.

2.2 PULL AND JUNCTION BOXES

- A. Manufacturers:
1. Circle AW
 2. Hoffman
 3. Rittal
 4. Approved equal
- B. Special oversized outlet boxes and junction boxes shall be code gauge steel and of the knockout type. Boxes shall have screw mounted covers for surface or flush mounting. Boxes shall be sized in accordance with applicable codes. Special outlet boxes shall accommodate the equipment served.
- C. In damp or wet locations sheet metal pull boxes shall be hot dipped galvanized after fabrication then finish painted with two coats of rust-resistant paint. Use covers with neoprene gaskets affixed with stainless steel screws. Seal around conduit entries with silicone-based sealant.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify exact locations of floor boxes and outlets prior to rough-in.

3.2 GENERAL INSTALLATION

- A. Install boxes in accordance with NECA "Standard of Installation."
- B. Install in locations as shown on drawings, and as required for splices, taps, wire pulling, equipment connections and compliance with regulatory requirements.
- C. Electrical boxes are shown on drawings in approximate locations unless dimensioned. Adjust box location up to 10 feet if required to accommodate intended purpose.
- D. Install boxes to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Division 07.
- E. Boxes shall be supported independently of the conduit system. Do not fasten boxes to ceiling support wires.
- F. Where boxes occur in pre-cast concrete construction, the Contractor shall coordinate said installation with the Contractor building the precast construction to produce shop drawings showing all box locations. Provisions shall be made for conduit entry from top or bottom of wall panels. All conduit and boxes shall be installed concealed and flush respectively. These requirements shall be met whether the precast work is done at the site or a location remote from the site.
- G. All boxes shall be plumb. Supports shall be noncombustible and corrosion resistant. In suspended ceilings, bar hangers shall be used to support the boxes from the ceiling channels. Refer to architectural drawings for exact heights of outlets not specified herein or indicated on the drawings. Unused knockouts in boxes shall be left sealed.
- H. Do not mount control or disconnecting devices more than 6 feet 6 inches above finish floor.
- I. Do not locate cabinets, outlets, or other apertures larger than 16 square inches in rated fire walls.
- J. Prior to installation, the Owner reserves the right to relocate any outlet or device within 6 feet of the location indicated on the plans at no additional cost.
- K. Where rigid conduit or IMC enters a box, fitting or device through a knockout, double locknuts and an insulated metallic bushing shall be used. EMT shall terminate at knockouts with an insulated throat fitting and one locknut. Connectors shall be made up tight to ensure electrical continuity of the raceway system.
- L. Provide all necessary supports and backing for all enclosures and equipment.
- M. Attach boxes, outlets, straps, cabinets, and equipment to wood with wood or lag screws, to metal with machine screws or bolts, and to concrete with expansion anchors or self-drilling metal anchors and machine screws or bolts. Use size and number of attachments as required to support equipment weight with a safety factor of four (4) minimum.
- N. Provide access doors where boxes are not exposed or located within an accessible ceiling unless indicated to be provided under other Divisions. Access doors shall comply with Division 08.

3.3 OUTLET BOX INSTALLATION

- A. Each lighting outlet, switch, receptacle, and other miscellaneous device shall be provided with a suitable box.
- B. Align adjacent wall mounted outlet boxes for receptacles, data/telephone outlets, and similar devices.
- C. Use flush mounting outlet box in finished areas.
- D. Locate flush mounting box in masonry wall to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat opening.
- E. Outlet boxes installed in masonry walls shall be set deep enough to allow a masonry facing over the plaster ring to frame the opening. Center outlet in a course of masonry. Masonry boxes shall be mounted as follows:
 - 1. From floor to height of 6 feet, mount so that bottom of box rests on block joint.
 - 2. Above 6 feet, mount so that top of box rests on block joint.
- F. Do not install flush mounting box back-to-back in walls; provide minimum of 6 inches separation. Provide minimum of 24 inches separation in fire-rated assemblies and acoustic rated walls.
- G. Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness.
- H. Use stamped steel bridges to fasten flush mounting outlet box between studs.
- I. Install flush mounting box without damaging wall insulation or reducing its effectiveness.
- J. Use adjustable steel channel fasteners for hung ceiling outlet box.
- K. Use cast outlet box in exterior locations, where exposed to the weather and wet locations.
- L. Where two or more of the same type devices occur adjacent to each other, they shall be in a gang type box with a gang type cover. Where different type devices occur adjacent to each other, space outlet boxes so that finish plates will be spaced 1 inch apart. Where receptacles or switches are shown side by side but at different heights, they shall be centered one above the other unless noted otherwise.
- M. Refer to Section 26 27 26 Wiring Devices for device mounting heights. Coordinate outlet locations and provide box extensions or other equipment as required where outlets occur in cabinet backs.
- N. Installation of boxes on existing concrete or masonry walls in detention areas shall be accomplished using four (4) ¼ inch diameter expansion anchors per box. Provide a washer and lock washer under the bolt head. Percussion anchors shall not be used. Apply epoxy sealant between fixture and concrete as specified elsewhere in these specifications and draw fixture up tight against the ceiling.
- O. Outlets in acoustical ceilings are to be in the center of the acoustical tile or in the center of a joint in the acoustical tile.
- P. Align all outlets horizontally or vertically for a uniform and neat appearance.

3.4 PULL AND JUNCTION BOX INSTALLATION

- A. Pull boxes and junction boxes shall be provided as indicated on the drawings and/or as required.
- B. Boxes larger than 200 cubic inches or 18 inches in any dimension shall use a hinged enclosure in interior dry locations, surface-mounted cast metal box in other locations.
- C. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only.
- D. Inaccessible Ceiling Areas: Install outlet and junction boxes no more than 6 inches from ceiling access panel or from removable recessed luminaire.

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Nameplates
- B. Wire and Cable Markers
- C. Pull and Junction Box Identification

1.2 SUBMITTALS

- A. Furnish for Engineer[Architect][Owner] review a [schedule][shop drawing] including equipment name, room name and number, nameplate size, font size, colors, and containing required nameplate information for those phenolic nameplates which identify electrical equipment as identified under Part 3 of this specification.

PART 2 PRODUCTS

2.1 NAMEPLATES

- A. Nameplates shall be laminated phenolic plastic with lettering engraved through the outer covering.
 - 1. Provide laminated phenolic plastic labels at all locations listed in the table under part 3 of these specifications.
- B. Lettering Heights
 - 1. Lettering shall be ½ inch high at all other equipment including but not limited to:
 - a. Panelboards
- C. Nameplates shall be securely fastened to the equipment using an adhesive or epoxy product appropriate for the environmental conditions where the nameplates are to be installed.
 - 1. Where the adhesive or epoxy are not suitable for the environmental conditions where the nameplates are to be installed, nameplates shall be securely fastened to the equipment with No. 4 Star drive(Torx), roundhead, cadmium-plated, steel self-tapping screws or nickel-plated brass bolts.
- D. Where panels serve only a specific load category, panel nameplates shall indicate the served category. Example: 'Lighting', 'Mechanical', 'NEC 700 Loads', 'NEC 702 Loads', 'A/V Equipment Loads', etc.
- E. Phenolic nameplates which identify electrical equipment shall be color coded based on the branch of power or system the equipment is connected to as outlined in the following table:

Branch of Power / System	Plate Face Color	Plate Lettering Color
Normal System	Black	White

2.2 NYLON STICK-ON TYPE LABELS

- A. Nylon stick-on labels shall be as manufactured by:
1. 3M
 2. Dymo
 3. Brady
 4. Brother P-Touch
- B. The labels shall be white with black lettering for concealed locations and clear with black lettering for exposed locations.

2.3 WIRE AND CABLE MARKERS

- A. Manufacturers:
1. Seton
 2. Tyton
 3. W. H. Brady Co
 4. Approved equal
- B. Markers shall be cloth tape, split sleeve, or tubing type.

PART 3 EXECUTION

3.1 PREPARATION

- A. Degrease and clean surfaces to receive identification materials.

3.2 NAMEPLATE REQUIREMENTS

- A. The following shall be equipped with nameplates (see Part 2 above for nameplate colors):

DEVICE/ITEM TYPE	NAMEPLATE TYPE
Panelboards	1

- B. The following information shall be included on each nameplate type (see above for details on nameplate types):

NAMEPLATE TYPE	REQUIRED INFORMATION
1	Equipment name per drawings, Voltage(s), 1 or 3 Phase, Normal or EPSS, Branch of Power (Ex: NEC 700, NEC 701, NEC 702, NEC 708, Life Safety, Critical Branch, Equipment Branch, etc.)

3.3 WIRE IDENTIFICATION

- A. Provide wire markers on each conductor in panelboards, gutters, pull boxes, and at load connection.
- B. Identify branch circuit or feeder number for power and lighting circuits.
- C. Identify with control wire number as indicated on equipment manufacturer's shop drawings.

3.4 CONDUIT IDENTIFICATION

- A. All exposed or accessible conduits shall be painted to indicate the system associated with the raceway.
- B. Conduit identification shall be a minimum 2" band of color.
- C. Identification shall occur at intervals not less than ten (10) feet and not less than once in each room.
- D. It shall be permissible to identify conduit fittings in lieu of the conduit subject to the spacing limitations noted herein.
- E. It shall be acceptable for junction box identification to serve as raceway identification subject to the spacing limits noted herein.

3.5 PULL BOX AND JUNCTION BOX IDENTIFICATION

- A. Each pull and junction box shall be neatly identified with permanent black markers or stick-on labels on the outside of the box (where the box is concealed) and on the inside of the box (in exposed locations). Identify each pull and junction box with a system description as follows:
 - 1. Equipment – Specific equipment identification, Panel name, circuit number

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Distribution panelboards

1.2 RELATED SECTIONS

- A. Section 26 05 53 - Electrical Identification

1.3 REFERENCES

- A. NEMA PB 1 - Panelboards
- B. NEMA PB 1.1 - Instructions for Safe Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less
- C. UL 50 - Cabinets and Boxes
- D. UL 67 - Panelboards

1.4 RECORD DOCUMENTS

- A. Record the final location of each panelboard.
- B. Record actual circuiting arrangements.

1.5 QUALITY ASSURANCE

- A. Installation: Panelboard installation shall conform to the latest revision of NEMA PB1.1, as applicable.

PART 2 PRODUCTS

2.1 GENERAL DESCRIPTION

- A. Owner has furnished ABB main distribution panelboard. The contractor shall install this panelboard per the construction documents, manufacturers requirements, and installation instructions herein.

PART 3 EXECUTION

3.1 PREPARATION

- A. Field Measurement: Verify that field measurements are as indicated, and that equipment will fit in the available space while maintaining required working space clearances.

3.2 INSTALLATION

- A. Install panelboards in accordance with manufacturer's instructions.

- B. Install panelboards plumb. Recessed panelboards shall be installed flush with wall surface. Anchor panelboards to structure.
- C. Mount panelboards with top of trim 78 inches above the floor. Install panelboards greater than 78 inches in height with bottom no more than 4 inches above the floor. In no case shall the handle of any device be mounted more than 78 inches above the floor when in its highest position.
- D. Installation of panelboards that are flush mounted in walls shall be coordinated with other trades as required to maintain the integrity of fire-resistive walls. Where the wall is required to be fire-rated, the wall opening shall be lined with a 5/8 inch fire-rated gypsum board and all gaps shall be filled with fire-resistive intumescent sealant.
- E. Provide facilities for connection of future loads. Spare conduits shall be stubbed into the nearest accessible ceiling space or to another accessible location out of each recessed panelboard. Minimum spare conduits: Four (4) empty; identify each as SPARE.
- F. Circuit breakers shall be arranged to reflect the size and order shown on the panel schedules.
- G. Provide filler plates for unused spaces in panelboards.
- H. Arrange and neatly lace conductors in panelboards, gutters, and terminal cabinets by means of nylon twine or wraps.
- I. Provide a typewritten circuit directory for each branch circuit panelboard. Directory cards shall be filled out completely with all circuits adequately marked. Spares shall be indicated by "Spare" in pencil. Directory cards shall indicate load served and room number for each circuit. The permanent room numbers, assigned by the Owner, shall be used on the directory cards. The Contractor shall verify the loads served by each existing circuit. Revise directories to reflect any circuiting changes.
- J. Provide typed or neatly handwritten circuit directory for each branch circuit panelboard. Revise directory to reflect circuiting changes required to balance phase loads.

3.3 ADJUSTMENT AND TESTING

- A. Tighten connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values for equipment connectors. Check tightness of bolted connections and circuit breaker connections using calibrated torque wrench or torque screwdriver per manufacturer's instructions.
- B. Inspect complete installation for physical damage, proper alignment, anchorage, and grounding.
- C. Measure steady state load currents at each panelboard feeder. If necessary, rearrange circuits in the panelboard to balance the phase loads to within 20 % of each other. Maintain proper phasing for multi-wire branch circuits.
- D. Upon completion of the above adjustment and testing, the Contractor shall energize the system and demonstrate proper operation of all equipment in the presence of the Owner's representative. Notify the Owner's representative at least one (1) week in advance of the dates when the demonstration will be undertaken. Demonstration shall include:
 - 1. Apparatus arranged for manual operation shall be operated under power then returned to its normal position.

2. Operation all control equipment and verify that it operates properly. Tests of control equipment shall include at least two operating cycles.
- E. Any deficiencies discovered because of the above tests shall be rectified and the work affected by such deficiencies shall be completely retested at the Contractor's expense.
- F. Instruments, gauges, testing equipment, protective devices and safety equipment for all testing shall be provided by the Contractor. Energy for the tests will be furnished by the Owner.

3.4 TRAINING

- A. The Contractor shall provide one (1) hour minimum of training for maintenance personnel in the maintenance and operation of the equipment. Training shall also cover maintenance and operation of other similar equipment, including enclosed circuit breakers and safety switches.
- B. A training plan shall be submitted in advance for approval, outlining the topics to be covered, the publications to be used, and the training schedule.
- C. The training shall be conducted by personnel thoroughly familiar with the equipment and its features. The training shall include instruction and over-the-shoulder hands-on training. As a minimum, the training shall cover:
 1. Recommended maintenance procedures and intervals.
 2. Operation of all control equipment to demonstrate that it operates in accordance with the requirements of this section.

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Conduit and equipment supports
- B. Anchors and fasteners

1.2 REFERENCES

- A. NECA Standard of Installation (National Electrical Contractors Association)
- B. NFPA 70 - National Electrical Code

1.3 SUBMITTALS FOR REVIEW

- A. Submit under provisions of Section 26 01 02.
- B. Product Data: Provide manufacturer's catalog data for fastening systems.

1.4 PROJECT FINALIZATION

- A. Submit under provisions of Section 26 01 02.
- B. Operation and Maintenance Data: Include manufacturer's descriptive literature, installation instructions, maintenance and repair data, and parts listing.

1.5 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Products: Listed and classified by Underwriters Laboratories, Inc. as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.1 PRODUCT REQUIREMENTS

- A. Materials and Finishes: Corrosion resistant.
- B. Select materials, sizes, and types of anchors, fasteners and supports to carry loads of equipment and conduit, including weight of wire in conduit.
- C. Anchors and Fasteners:
 - 1. Concrete Structural Elements: Use precast inserts, expansion anchors and preset inserts.
 - 2. Steel Structural Elements: Use beam clamps, spring steel clips, and welded fasteners.
 - 3. Concrete Surfaces: Use self-drilling anchors and expansion anchors.
 - 4. Hollow Masonry, Plaster, and Gypsum Board Partitions: Use toggle bolts and hollow wall fasteners.

5. Solid Masonry Walls: Use expansion anchors and preset inserts.
6. Sheet Metal: Use sheet metal screws.
7. Wood Elements: Use wood screws.

2.2 FORMED STEEL CHANNEL

- A. Manufacturers:
 1. B-Line
 2. Eaton
 3. McMaster -Carr
 4. Thomas & Betts
 5. Approved equal
- B. Description: Galvanized steel or zinc plated.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Locate and install anchors, fasteners, and supports in accordance with NECA "Standard of Installation".
 1. Do not fasten supports to pipes, ducts, mechanical equipment, or conduit.
 2. Do not drill or cut structural members.
 3. Obtain permission from Architect/Engineer before drilling or cutting structural members.
- B. Fabricate supports from structural steel or formed steel members. Rigidly weld members or use hexagon-head bolts to present neat appearance with adequate strength and rigidity. Use spring lock washers under all nuts.
- C. Secure floor mounted equipment to floor with machine bolts and anchors in accordance with the manufacturer's recommendations and seismic requirements.
- D. Install surface-mounted cabinets and panelboards with minimum of four (4) anchors. Cabinets and panelboards shall not be secured to hollow masonry, plaster, or gypsum board partitions - provide additional blocking as required between studs to securely anchor the cabinet or panelboard.
- E. In wet and damp locations use steel channel supports to stand cabinets and panelboards 1 inch off wall.
- F. Use sheet metal channel to bridge studs above and below cabinets and panelboards recessed in hollow partitions.

END OF SECTION

PART 1 GENERAL

1.1 DESCRIPTION

- A. This section describes the materials and installation requirements for Surge Protective Devices (SPD), previously referred to as Transient Voltage Surge Suppressors (TVSS). These devices are used to protect sensitive electronics from the effects of lightning induced transients, substation switching transients and internally generated transients resulting from inductive and/or capacitive load switching.

1.2 RELATED SECTIONS

- A. Section 26 05 19 - Building Wire and Cable
- B. Section 26 05 26 - Grounding and Bonding
- C. Section 26 05 32 - Boxes
- D. Section 26 05 53 - Electrical Identification

1.3 REFERENCES

- A. ANSI/UL 1449-2014 - Surge Protective Devices
- B. UL 1283 - Electromagnetic Interference Filters
- C. ANSI/IEEE C62.41.1-2002 - IEEE Guide on the Surge Environment in Low Voltage (1000 V and Less) AC Power Circuits; C62.41.2-2002 - IEEE Recommended Practice on Characterization of Surge Voltages in Low Voltage AC Power Circuits
- D. ANSI/IEEE C62.45 - IEEE Guide for Surge Suppressor Testing
- E. NFPA 70 Article 285

1.4 SUBMITTALS FOR REVIEW

- A. Submit under provisions of Section 26 01 01.
- B. Product data and manufacturer's installation instructions for non-approved manufacturers shall be submitted for review ten days prior to the bid date.
- C. The submittals shall also include:
 - 1. Dimensional drawing of each SPD type
 - 2. Catalog sheets showing voltage, ratings, protection characteristics, etc.
 - 3. Wiring diagrams
 - 4. ANSI/UL 1449-2006 Listing, Standard for Safety, Surge Protective Devices, documentation.
 - 5. UL 1283 Listing, Electromagnetic Interference Filters, documentation.
 - 6. ANSI/IEEE C62.41 and C62.45, Category C_{High} (20kV-1.2/50, 10kA-8/20µs waveform) clamping voltage test results.

1.5 PROJECT FINALIZATION

- A. Submit under provisions of Section 26 01 02.
- B. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, installation instructions, maintenance and repair data, and parts listing.
- C. Warranty: Submit manufacturer's warranty and ensure forms have been filled out completely in Owner's name and registered with the manufacturer.

1.6 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Product: Listed and classified by Underwriters Laboratories, Inc. as suitable for the purpose specified and indicated.

1.7 WARRANTY

- A. Submit under provisions of Section 26 01 02.
- B. Guarantee the SPD's furnished under this section against defective parts or workmanship for a period of ten (10) years after the date of substantial completion. The guarantee shall cover full parts and labor.
- C. Provide a label for each SPD which indicates the warranty expiry date and a phone number to call for service/warranty inquiries.

PART 2 PRODUCTS

2.1 GENERAL

- A. Manufacturers:
 - 1. ABB, Current Technology® Series
- B. The manufacturer of the SPD's shall be the same as the manufacturer of the service entrance and distribution equipment in which the devices are installed. Distribution equipment shall be fully tested and certified to the following UL standards:
 - UL 67 = Panelboards,
- C. Description: Provide SPDs at the following locations:
 - 1. All service entrance equipment
 - 2. Additional locations as shown on the drawings
- D. All SPD components shall be rated for operation from 30 to 120 °F and from 0 to 85 % humidity, non-condensing.

2.2 SERVICE ENTRANCE AND DISTRIBUTION EQUIPMENT

- A. All SPDs shall be internal unless specifically noted otherwise.
- B. SPD shall be listed to ANSI/UL 1449-2006 and UL 1283, Electromagnetic Interference Filters.

- C. Integrated surge protective devices (SPD) shall be a Type 2 or Type 4 Component Recognized SPD in accordance with ANSI/UL 1449-2006, Section 37.3.2 and 37.4 at the standard's highest short circuit current rating (SCCR) of 200 kA.
- D. SPD shall be tested with the ANSI/IEEE Category C_{High} exposure waveform (20kV-1.2/50μs, 10kA-8/20μs).
- E. Pulse life test: Capable of protecting against and surviving 20,000 ANSI/IEEE Category C_{High} transients without failure or degradation of clamping voltage by more than 10%.
- F. SPD shall provide suppression for all modes of protection:
1. L-L
 2. L-N
 3. L-G
 4. N-G in WYE systems
- G. SPD ratings shall be:
1. The minimum surge current rating shall be 240 kA per phase (120 kA per mode) for service entrance
 2. The minimum surge current rating shall be 120 kA per phase (60 kA per mode) for distribution applications.
 3. UL 1449 clamping voltage must not exceed the following:
- | <u>VOLTAGE</u> | <u>L-N</u> | <u>L-G</u> | <u>N-G</u> | <u>L-L</u> |
|----------------|------------|------------|------------|------------|
| 208Y/120 | 800V | 800V | 800V | 1200V |
- H. Minimum ANSI/UL 1449-2006 withstand (I_n) rating to be 20kA per mode
- I. SPD shall be designed to withstand a maximum continuous operating voltage (MCOV) of not less than 125% for 120/208V nominal RMS operating system voltages.
- J. SPD shall be constructed of one self-contained suppression module per phase.
- K. Visible indication of proper SPD connection and operation shall be provided. The indicator lights shall indicate which phase as well as which module is fully operable. The status of each SPD module shall be monitored on the front cover of the enclosure as well as on the module. A push-to-test button shall be provided to test each phase indicator. Push-to-test button shall activate a state change of dry contacts for testing purposes.
- L. SPD shall be equipped with an audible alarm which shall activate when any one of the surge current modules has reached an end-of-life condition. An alarm on/off switch shall be provided to silence the alarm. The switches and alarm shall be located on the front cover of the enclosure.
- M. A surge counter shall be located on the diagnostic panel on the front cover of the enclosure. The counter shall be equipped with a manual reset and battery backup to retain memory upon loss of AC power.
- N. A connector shall be provided along with dry contacts (normally open or normally closed) to allow connection to a remote monitor or other system. The output of the dry contacts shall indicate an end-of-life condition for the complete SPD or module.

- O. Terminals shall be provided for necessary power and ground connections.
- P. The manufacturer shall install SPD in the power distribution equipment for use at the utility service entrance to the facility and in each distribution panel to be protected.
- Q. The SPD shall be installed on the load side of a service disconnect overcurrent device per NEC.
- R. Where the internal SPD is connected to the power system with cables, keep the conductors as short as possible with no sharp bends.
- S. The SPD ground shall be connected to the power system ground.
- T. Accessories:
 - 1. A remote monitoring device shall be provided to directly connect to the SPD with a dry contact connector for simple installation. The device will have indicator lights and an audible alarm to monitor for normal and fault conditions.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install the SPD in accordance with manufacturer's instructions and make all necessary power and control connections.
- B. Provide identification of all SPD components.
- C. Provide a fused disconnect, circuit breaker or other disconnecting means for each SPD as required based on manufacturers installation instructions.

END OF SECTION