Project Manual

Tri-Cities CIC: Chiller Replacement

Washington State University
Richland, WA

Project No.1744-2022
Issued 11/8/2022
Washington State University
Facility Services, Capital

The Architect or Engineer Stamp on this page applies to all portions of the Specifications below.

ARCHITECTS:

MSI Engineers, Inc.
108 N. Washington, Ste 505
Spokane, WA 99201
Phone: (509) 624-1050
Fax

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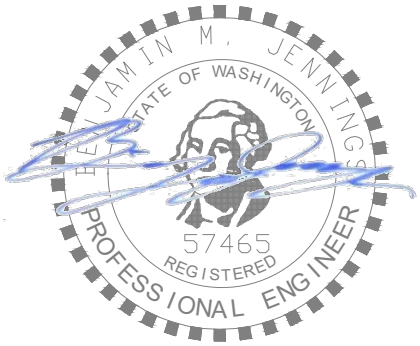
Specification Divisions 23 & 26

END OF ARCHITECTURAL / ENGINEERING STAMPS



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Washington State University
Tri-Cities CIC: Chiller Replacement
Richland, WA

Sealed bids are being requested by the Board of Regents of Washington State University, for the above referenced project.

Project Scope:

> This project involves the removal of the existing 17,400lb chiller from the CIC, including capturing 500lb of R-22 refrigerant. Remove old chilled water piping to accommodate removal of the chiller and installation of new equipment. Remove pumps, piping, valves, and other associated equipment inside of the mechanical room to accommodate new equipment. Install new air-cooled high efficiency chiller and associated equipment on the existing pad outside and pipe the chilled water into the building, replacing the necessary pumps, valves, and other equipment. Remove and replace necessary electrical lines and equipment to support the new chiller. Substantial Completion shall be achieved by June 1, 2023. Proposals MUST BE based on this Contract Time.
>
> Project Address: WSU CIC Building, 2770 Crimson Way, Richland, WA 99354

Bid Estimate: $550,000.00 to $650,000.00

Bids will be received prior to 2:00 p.m. December 6, 2022; either by email to contracts@wsu.edu or in hard copy at McCluskey Services Building, 2425 East Grimes Way., Pullman, WA. Proposals will then be publicly opened and read aloud at 2:30 p.m. by https://wsu.zoom.us/j/98934587645?pwd=TktOL2hBcUU2aFdTVGtJSElIS1RyQT09&from=addon or Phone 253-215-8782 and entering Meeting ID 989 3458 7645. Attendance in person is not allowed.

A pre-bid conference for general contractors will be held at 10:00 a.m. on November 23, 2022 at the CIC Building, 2770 Crimson Way, Richland, WA 99354.

Parking on campus is enforced 24 hours a day, every day. It is bidder's responsibility to obtain parking permits to attend pre-bid meetings, site visits, and bid openings. Daily permit rates may be found at: http://transportation.wsu.edu/TempFees.html. Identify the meeting and project when obtaining the permit to receive appropriate rates.

Bid documents may be obtained at https://facilities.wsu.edu/facilities-services-capital/contractors/. Contractors who would like to be included on the Planholder's list shall either attend the pre-bid meeting or request to be added by emailing contracts@wsu.edu.

Printing Disclaimer: The bidding documents are available for all interested bidders and plancenters. The University does not provide printing services; it is the bidder's responsibility to print the drawings to the appropriate scale indicated. We encourage the use of professional printing shops.

Owner reserves the right to reject any and all bids and to waive any informalities or irregularities in the bids received.

Maja S. Huff

509-335-9082
Contracts@wsu.edu
Facilities Services
Washington State University

END OF SECTION 00 11 13

PART 1 GENERAL

1.01 PROJECT IDENTIFICATION

A. Refer to the Advertisement for Bids for Project identification, availability of bidding documents, Prebid Conference, and Contract completion date. Refer to Summary of Work, Section 01 11 00, for a brief description of the Work.

1.02 BIDDER QUALIFICATIONS

A. Contractor Registration:

1. Bidders subject to the Contractor's Registration Act (RCW Chapter 18.27) must show their State of Washington Contractor's license number on the Form of Proposal. In addition, bidders are cautioned to verify that all subcontractors submitting bids are also registered and licensed in accordance with the laws of the State of Washington. Owner is prohibited by virtue of RCW 39.06.010 from executing any Contract for public works with any contractor who is not registered or licensed in accordance with the laws of this state. Prior to submitting a bid, bidder must obtain an appropriate clearance and license to do business in the State of Washington as follows:

   a. Contractor's License: Make license application to the Department of Labor and Industries, Contractor's Registration, P.O. Box 7689, Olympia, Washington 98504.

   b. Registration Number: Out-of-State Contractors must obtain a registration number and permission to do business in the State of Washington from the Secretary of State, Olympia, Washington 98501.

   c. Other Registrations: Register with the State Department of Revenue as a contractor engaging in business in this state and register with the State Department of Labor and Industries and the Employment Security Department.

2. Payment and Performance Bonds:

   a. Bidders must be able to furnish satisfactory separate Payment and Performance Bonds for full amount of the initial Contract Sum, plus sales tax.

1.03 EXAMINATION OF SITE AND CONTRACT DOCUMENTS

A. Before submitting a bid or proposal, bidders shall carefully examine the Contract Documents, visit the Project site, and fully inform themselves as to all existing conditions and limitations, and shall include in their bid or proposal a sum to cover the cost of all items included in the Work, and shall rely on their own examination in making their bid or proposal. No change in the Work, the

Contract Sum, or the Contract Time will be allowed for issues that would have been reasonably apparent by the foregoing examination.

B. Bidder acknowledges that it has satisfied itself as to the character, quality and quantity of surface and subsurface materials or obstacles to be encountered insofar as this information is reasonably ascertainable from an inspection of the Project site, including all exploratory work done by Owner, as well as from the Drawings and Specifications made a part of the Contract Documents.

C. Bidder acknowledges that adjoining areas will be in normal course during the Work. Bidder should anticipate pedestrian and traffic congestion, limited parking, and the need to coordinate all Work with ongoing operations.

D. Owner assumes no responsibility for any conclusions or interpretations made by bidder based on the information made available by Owner. Should a bidder find discrepancies or omissions in the Drawings or Specifications, or should bidder be in doubt as to their meaning, bidder shall at once notify Owner. If appropriate, Owner will send written instructions to all bidders by addenda. Questions received less than 7 Days before the time of bid opening may not be answered. All issued addenda shall be incorporated into these Contract Documents.

1.04 PREBID CONFERENCE

A. All bidders are encouraged to attend a pre-bid conference. Refer to the Advertisement for Bids for the date, time and location.

B. Parking on campus is enforced 24 hours a day, every day. It is bidder's responsibility to obtain parking permits to attend pre-bid meetings, site visits, and bid openings. Due to the possibility of parking at multiple locations on campus, bidders are advised to consider obtaining Orange Temporary Permits. Go to http://transportation.wsu.edu/TempFees.html for more information about parking permits.

C. All bidders are encouraged to attend a pre-bid conference. The pre-bid conference will be held virtually by zoom. Bidders shall refer to the Advertisement for bids for the link to the meeting.

D. The University is requiring that Zoom be downloaded and installed via a computer client rather than connecting through a web browser plugin. The computer client can be found here: https://support.zoom.us/hc/en-us/articles/207373866-Zoom-Installers

1.05 CLARIFICATIONS

A. Should bidders find discrepancies in, omissions from, or unclear information within the Contract Documents, they should notify Owner at once. Owner shall issue a written instruction in the form of an addendum to all bidders. Neither the Owner nor Architect/Engineer will be responsible for any oral instructions. Questions received less than 7 Days before bid opening may not be answered.

All addenda issued prior to the opening of bids will be incorporated into the Contract.

1.06 SPECIFIED PRODUCTS

A. Bids must be based upon items identified in the Specifications or approved substitutions. In certain cases, specific items have been named because of operational or maintenance considerations; approval of substitutions should not be assumed.

B. Requests for approval of substitutions must be made in writing and received by Owner at least 7 Days prior to the date of bid opening. Said request must include complete descriptions, technical data, and performance records. Any approval of the proposed substitution will be made by addendum issued to all bidders.

C. To submit substitution requests prior to Bid opening:

1. Only one substitution request per bidder will be considered for each product.
2. Requests for substitutions shall provide sufficient data to allow Owner to evaluate the suitability of the proposed product. Bidder must clearly identify product and model number of proposed substitution.

D. By requesting a substitution, bidder represents and warrants that (1) it has personally investigated the proposed material or product and determined that it is equal or better in all respects to that specified, (2) the same or better warranty will be provided for the substitution, (3) it has coordinated with affected subcontractors, (4) the substitution will not impact other parts of the Work, (5) the aggregate costs associated with the substitution actually reduces its bid amount, (6) all costs associated with the substitution are included in its bid, and (7) it waives any known or unknown future claim for an increase in the Contract Sum or Contract Time associated with the substitution.

E. Owner retains full discretion over whether to approve a substitution, and Owner's approval does not relieve bidder of the above requirements.

1.07 TAXES

A. State of Washington Sales Tax shall not be included in the bid price, except that the retail sales tax upon sales and rentals to prime contractors and subcontractors of tools, cranes, air compressors, bulldozers, lubricating oil, sandpaper, form lumber, and similar items of material and equipment which are primarily for use by the bidder rather than for resale as a component part of the finished work, shall be included in the bid price. (See WAC 458-20-170 (State Department of Revenue Rule 170))

B. Sales tax applicable to the Contract Sum will be added to the Contract Sum by Owner at the time the Contract (Section 00 50 00) is written and shall be paid to

Contractor. Contractor shall then remit payment for the sales tax to the State Department of Revenue in conformance with the law.

1.08 FILING FEES

A. Applicable state laws concerning prevailing wages, hours, workers' compensation, and other conditions of employment are called to the attention of bidders for their compliance. Bidders shall include in their bid any and all fees, including filing fees, required to comply with applicable labor laws.

1.09 PAYMENT AND PERFORMANCE BONDS

A. Upon award of the Contract, the successful bidder will be required to provide Owner with satisfactory separate payment and performance bonds. Cost of bond premiums must be included in the bidder's proposal.

1.10 FORM OF PROPOSAL

A. Proposals must be formatted in accordance with the following:

1. Bidder must utilize the Form of Proposal, examples of which are included in the Contract Documents; all numbers must be clearly and legibly stated both in writing and in figures; and signatures must be in longhand.
2. Bids must not contain any recapitulation of the Work to be done.
3. Bidders must include prices for all Alternate Bid items if they are included in the Form of Proposal.
    a. Bidders shall bid upon all Alternates indicated in the Form of Proposal. When bidding on alternates for which there is no charge, bidder shall write the words "No Charge" or some similar designation in the space provided on the Form of Proposal. If a bidder fails to bid an alternate, or notes "no bid," it will be construed as meaning that there will be no change in the Contract Sum and that the alternate is included in the Contract Sum.
4. Bids shall be received either electronically or in hard copy:
    a. Electronic Bids: Bidders may submit their bid via email to contracts@wsu.edu prior to the bid submission deadline. The emailed bid must include all documents that would have normally been submitted in the sealed envelope, including but not limited to the Form of Proposal and bid bond, in either PDF or Image format.
        1) The official clock for receipt of electronic bids will be the time and date stamp by WSU email services, not bidders email services.
    b. Hard Copy Bids: Each part of the Form of Proposal must be sealed in its own opaque envelope and marked "Proposal, Tri-Cities CIC: Chiller Replacement". Bidders name shall appear on the outside of this sealed envelope. All bids are to be delivered or

mailed to Facilities Services, P.O. Box 641150, McCluskey Services Building, Washington State University, Pullman, WA 99164-1150. If mailed, the Bid envelope shall be enclosed in another envelope for mailing.

1) An official clock, at the office location designated for receipt of bids, will be designated by Owner for determining the timely receipt of each bid.

c. Bidders are solely responsible for delivery of their proposals at the specified location and before the specified time set for receipt of bids.

5. Bids will be received on the dates and at the times indicated in the Advertisement for Bids.

6. Proposals received and determined untimely by Owner, may be considered as non-responsive and hard copy bids will be returned to bidder unopened, or notification will be made by email for electronic bids.

7. Bids will be received until the respective times indicated in the Advertisement for Bids. They must be received prior to the respective times stated; i.e., where bids for Part A are required until 2:00 p.m., all bids received by 1:59:59 p.m. are timely; all bids received on or after 2:00:00 p.m. are untimely.

8. Proposals shall consist of the following components:

a. Proposal: Completed Part A proposal indicating the following:

1) Base Bid and Alternate Bid (if any) amounts;

2) Acknowledgment of Addenda received;

3) Signature, Corporate Identification, and Contractor License number; and

4) Bid Security to be attached to Part A proposal form.

9. All proposals will remain sealed/unshared until the bid opening.

1.11 BID ALTERNATES, ALLOWANCES AND UNIT PRICES

A. Bid Alternates, Allowances, and Unit Prices adjust the Project scope by adding, deleting, or modifying specific parts of the Work as stated hereinafter.

B. An Alternate is an amount proposed by bidders and stated on the Bid Form for certain construction activities defined in the bidding documents that may be added to or deducted from the Base Bid amount and/or the Owner decides to accept a corresponding change in either the amount of construction to be completed, or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.

1. Each bidder shall submit, on the Form of Proposal, an amount for each Bid Alternate stating the difference in cost from the Base Bid amount for adding, deleting, or modifying specific materials and/or construction.
2. The difference in cost shall include all deletions, additions, and adjustments to all trades as may be necessary by each modification.
3. Only Alternates authorized by these specifications or pursuant to addenda will be considered.

C. An Allowance is an amount established in the Contract Documents for inclusion in the Contract Sum to cover the cost of prescribed items not specified in detail sufficient to estimate at time of bid.

1. Each bidder shall include in the Base Bid amount the amount for each Allowance as identified in the bidding documents.

D. A Unit Price is an amount as a price per unit of measurement for materials or services added or deleted from the Base Bid amount.

1. Each bidder shall submit on the Bid Proposal Form, an amount for each Unit Price stating the difference per unit or measurement for materials or services added or deleted from the Base Bid amount.
2. The Unit Price stated shall be used as the amount for either adding or deleting the item per unit of measurement from the Work.
3. The Unit Price amounts submitted on the Form of Proposal shall be used as the cost per unit of measurement for the entire duration of the Contract.

1.12 BID GUARANTEE

A. Bidder shall furnish a bid guarantee in the form of a cashier's check or bid bond made payable to the Board of Regents of Washington State University for an amount equal to at least 5% of the total Base Bid amount, as evidence of good faith and as a guarantee that, if awarded the Contract, the bidder will execute the Contract and provide payment and performance bonds as required.

1. Electronic submission of the Bid Guarantee shall constitute full submittal as if delivered in hard copy.

B. Should the successful bidder fail to enter into a Contract and furnish satisfactory bonds within 10 Days after its proposal has been accepted, the bid security shall be forfeited as liquidated damages.

C. Owner reserves the right to hold the bid guarantee of the 3 lowest bidders until the successful bidder has entered into a contract and furnished required bonds.

1.13 MWBE PARTICIPATION

A. Washington State University is committed to the enhancement of opportunities for minority and women owned and controlled businesses in public contracting. The use or solicitation of minority and women's business enterprise firms is expressly encouraged.

1.14 MODIFICATION OF PROPOSALS

A. Modifications to proposals already submitted will be permitted only if requested in writing over the signature of the bidder and provided such requests are received prior to the time set for receipt of bids.

B. The original Form of Proposal will remain unopened until bid opening. Modifications in the form of facsimile transmissions will not be accepted.

C. Withdrawal of proposals will be permitted only if requested in writing over the signature of the bidder and provided such requests are received prior to the time set for receipt of bids.

D. Withdrawal requests in the form of facsimile transmissions will not be accepted.

E. After the scheduled closing time for the receipt of Form of Proposals, no bidder will be permitted to withdraw a proposal unless said award is delayed for a period exceeding 60 Days.

1.15 ALTERATIONS PROHIBITED

A. Except as otherwise provided herein, Forms of Proposal which are incomplete, or which are conditioned in any way, or which contain items not called for in the Proposal Form, or which are not in conformity to the law, may be rejected.

B. The Form of Proposal invites bids on specific Drawings and Specifications. Only the amounts and information asked for on the Form of Proposal furnished will be considered.

1.16 BID PROTEST PROCEDURES

A. A bidder protesting for any reason the bidding documents, a bidding procedure, the University's objection to a bidder or a person or entity proposed by the bidder, including but not limited to, a finding of non-responsibility, the award of the Contract or any other aspect arising from, or relating in any way to, the bidding, shall file a written protest with the University within two (2) business days of the event giving rise to the protest. (Intermediate Saturdays, Sundays, and legal holidays are not counted as business days.) The written protest shall include the name of the protesting bidder, the title of the bid under which the protest is submitted, a detailed description of the specific factual and legal grounds for the protest, copies of all supporting documents, evidence that the apparent low bidder has been given notice of the protest, and the specific relief requested. The written protest shall be sent by email to contracts@wsu.edu.

B. Upon receipt of the written protest, the University will consider the protest. The University may, within three (3) business days of the University's receipt of the protest, provide any other affected bidder(s) the opportunity to respond in writing to the protest. If the protest is not resolved by mutual agreement of the protesting bidder and the University, the Assistant Vice President for Facilities Services, Capital of the University, or her or his designee, will review the issues and promptly furnish a final and binding written decision to the protesting bidder, and any other affected bidder(s), within six (6) business days of the University's receipt of the protest. (If more than one (1) protest is received, the University's decision will be provided within six (6) business days of the University's receipt of the last protest.) If no reply is received from the University during the six (6) business-day period, the protest will be deemed rejected.

C. Failure to comply with these protest procedures will render a protest waived.

D. Timely and proper compliance with, and exhaustion of, these protest procedures shall be a condition precedent to any otherwise permissible judicial consideration of a protest.

1.17 LOW RESPONSIBLE BIDDER

A. It is the intent of Owner to award the Contract to the low responsible bidder. Before award, the bidder must meet the following bidder responsibility criteria to be considered a responsible bidder. The bidder may be required by Owner to submit documentation demonstrating compliance with the criteria. Bidder must:

1. Have a current certificate of registration in compliance with chapter 18.27 RCW, which must have been in effect at the time of bid submittal;
2. Have a current Washington Unified Business Identifier (UBI) number;
3. If applicable:
    a. Have Industrial Insurance (workers' compensation) coverage for the bidder's employees working in Washington, as required in Title 51 RCW;
    b. Have a Washington Employment Security Department number, as required in Title 50 RCW;
    c. Have a Washington Department of Revenue state excise tax registration number, as required in Title 82 RCW;
4. Not be disqualified from bidding on any public works contract under RCW 39.06.010 or 39.12.065(3).
5. 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 first date of advertising for this project.

6. 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, any provision of chapter 49.46, 49.48, or 49.52 RCW, as defined in RCW 49.48.82.

B. In addition to the bidder responsibility criteria above, bidder must also meet the following supplemental bidder responsibility criteria applicable to the Project:

1. The ability, capacity, and skill of bidder to perform the service required;
2. The experience and efficiency of bidder;
3. Whether bidder can perform the Contract within the time specified;
4. The satisfactory completion of previous contracts or services;
5. Such other information having a bearing on the decision to accept a bid proposal.

C. Whenever Owner evaluates Contractor's responsibility, the foregoing may be taken into account. In addition to Contractors experience, evaluation of bidder's responsibility will also be based on the documented experience of the Project Manager, Project Engineer, and the Superintendent proposed for the Project. A minimum of three projects of comparable size and scope will be required for bidder.

D. For projects involving research and laboratory space, or a combination of research, laboratory, and office space, the required experience for bidder, Project Manager, Superintendent, and Project Engineer shall be as follows:

1. Bidder shall have documented experience as a GC on projects of similar type, value, and scope for a minimum of eight years or three projects.
2. The Project Manager shall have documented experience managing and planning projects of similar type, value, and scope as the Contractor's Project Manager for a minimum of five years or three projects.
3. The Superintendent shall have documented experience directing daily activities of all subcontractors on projects of similar type, value, and scope as the GC's Superintendent for a minimum of five years or three projects.
4. The Project Engineer shall have documented experience coordinating and administering the work on projects of similar type, value and scope as the GC's Project Engineer for a minimum of three years or two projects.

E. Within 48 hours of receipt of request, apparent low bidder will provide such information about its team as Owner determines to be reasonably necessary to evaluate the responsibility of the bidder. Failure to reply with requested information will render a bidder non-responsible at Owner's option. At minimum, a bidder shall provide:

1. A financial statement;
2. List of projects currently under construction, including current contract amount and status of each;
3. Names and resumes of proposed Project Manager, Project Engineer, and Superintendent;
4. Name of bonding company/agent; and
5. References including project and owner name, a project contact, and project contact telephone number.

F. As evidence that bidder meets the bidder responsibility criteria, the apparent low bidder must submit documentation as may be required above to the Owner within 48 hours of the bid submittal deadline. Owner reserves the right to request such documentation from other bidders also.

G. Owner will review Contractor's past Contract Performance to assist in evaluating the contractor's qualifications and proven ability to successfully perform future contracts only when past performance has been previously documented via the Contract Performance Program.

H. If Owner determines bidder does not meet the bidder responsibility criteria above and is therefore not a responsible bidder, Owner shall notify bidder in writing with the reasons for its determination. If bidder disagrees with this determination, it may appeal the determination within 24 hours of receipt of Owner's determination by presenting additional information to Owner. Owner will consider the additional information before issuing its final determination. If the final determination affirms that bidder is not responsible, Owner will not execute a Contract with any other bidder until 2 business days after the bidder determined to be not responsible has received the final determination.

1.18 CONTRACT AWARD

A. Owner intends but is not required to enter into a contract with the successful bidder, for all Work called for in the Contract Documents.

B. The determination of the successful bidder will be made on the basis of the sum of the Base Bid together with Owner-selected Alternates.

C. The responsibility of bidder and its subcontractors will be considered in making the award. Owner reserves the right to reject any or all bids and to waive informalities advantageous to Owner and/or the protection of the public interest.

D. Reinstatement of Bid Alternate not initially selected shall be in accordance with provisions of the Bid Proposal Form of Proposal.

1.19 CONTRACT FORMS

A. Owner's standard form Contract is included with the Contract Documents.

END OF SECTION 00 21 13

Washington State University
Tri-Cities CIC: Chiller Replacement
Richland, WA

Refer to Instructions to Bidders for bid submittal procedures.

Bidder's Firm Name: _____ Date: _____

To: Facilities Services, Capital
McCluskey Services Building, P.O. Box 641150
Washington State University
Pullman, Washington 99164-1150

Pursuant to and in compliance with the Advertisement for Bids and the Instructions to Bidders, the Bidder, having carefully examined the Contract Documents entitled Tri-Cities CIC: Chiller Replacement and having visited the Project site and examined the conditions affecting the Work, hereby proposes and agrees to provide all labor, materials, equipment, services, and incidentals necessary to complete the Work for the following stipulated sums:

A. BASE BID

_____

_____DOLLARS ($_____),

B. UNIT PRICES – NOT USED

C. ALTERNATES – NOT USED

D. REINSTATEMENT OF BID ALTERNATES – NOT USED

E. SALES TAX

The Bidder agrees that the amounts indicated in the proposal do not include Washington State and local sales taxes except as required by the Instructions to Bidders.

F. CONTRACT PROVISIONS

Should the Bidder be notified of the acceptance of this proposal within 60 Days from the date set for the opening thereof or at any time thereafter before this proposal is withdrawn, the bidder agrees to execute a Contract for the Work and to furnish the required bonds.

1. TIME OF COMPLETION
The bidder agrees, if awarded a Contract for the Work, to complete the Work

within the Contract Time specified.

2. LIQUIDATED DAMAGES
The bidder agrees that time is of the essence of the Contract and acknowledges that the amount of damages specified is a measure of the damages which the Owner will sustain should the Bidder fail to complete the Work within the Contract Time.

G. BID GUARANTEE

The Bidder agrees that the bid guarantee accompanying the Part A Form of Proposal is left in escrow with Owner, that the amount of the guarantee is the measure of the damages that Owner will sustain by failure of the bidder to execute a Contract for the Work and furnish required bonds, and that if the bidder fails to deliver said documents within 10 Days after receipt of notice of award to the bidder, the bid guarantee shall become the property of Owner.

H. MINORITY AND WOMEN'S BUSINESS ENTERPRISE (MWBE) PARTICIPATION

Owner is committed to the enhancement of opportunities for minority and women owned and controlled firms in public contracting. While neither required, nor a part of bidder responsiveness, the use or solicitation of minority and women business enterprises is expressly encouraged.

J. ADDENDA

The bidder hereby acknowledges receipt of Addendum by number(s):

_____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____

K. PREVAILING WAGE CERTIFICATION

The bidder has not 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, any provision of chapter 49.46, 49.48, or 49.52 RCW, as defined in RCW 49.48.82.

L. DECLARATION

The bidder represents and warrants that he/she possess the authority to sign for and bind bidder.

The Bidder declares under penalty of perjury under the laws of the State of Washington, that all of the foregoing information as recited is true and correct to the best of his/her knowledge.

Bidder's Firm Name: _____

Signed By: _____ Official Title: _____

Print Name: _____

Address: _____

City: _____ State: _____ Zip Code: _____

Telephone: _____ Fax: _____

State of Washington Contractor's License Number: _____

Federal Tax Identification Number: _____

Email Address: _____

The firm represented by the above signature is a:

Sole Proprietorship _____
Partnership _____
Corporation _____ State of Incorporation _____
Other _____

END OF SECTION 00 42 13

Tri-Cities CIC: Chiller Replacement

Agreement between Owner and Contractor
(Fixed Contract Sum)

This AGREEMENT is effective as of the date of the first signature on the Agreement so long as all other parties' authorized signatories have also executed the Agreement. This Agreement is made by and between the following parties in connection with the Project identified below.

OWNER:	Washington State University c/o Facilities Services, Capital P.O. Box 641150 Pullman, WA 99164-1150
CONTRACTOR:	[To be determined]
ARCHITECT (A/E):	MSI Engineers Inc, 108 N. Washington, Ste 505 Spokane WA 99201
PROJECT:	Tri-Cities CIC: Chiller Replacement 2770 Crimson Way, Richland, WA 99354

In consideration of the mutual covenants and obligations contained herein, Owner and Contractor agree as set forth herein.

Article 1
The Work of the Contract

1.1 Contractor to fully execute the Work. Contractor shall fully execute the entire Work in strict accordance with the Contract Documents, and shall provide all material, equipment, tools, and labor necessary to timely complete the Work described in and reasonably inferable from the Contract Documents, except to the extent specifically indicated to be the responsibility of others.

1.2 Contractor to further Owner's interests. Contractor accepts the relationship of trust and confidence established by this Agreement and covenants with Owner to cooperate and collaborate with Owner and others involved with the Project and to exercise Contractor's best skill and judgment; to furnish efficient, professional construction administration, management services and supervision with sufficient quantities of fully qualified, competent and experienced personnel; and to perform the Work in an expeditious and economical manner consistent with Owner's interests. The parties will endeavor to promote harmony, cooperation and mutual respect among the Project participants to the fullest extent possible in order to further the success of the Project and to effect prompt and successful completion of the Project within the requirements of the Contract Documents, the Contract Time and the Contract Sum.

Article 2
Contract Documents

2.1 The Contract Documents. The "Contract Documents" form the "Contract." The Contract Documents consist of this Agreement (Agreement between Owner and Contractor or the "Agreement"); any attached Exhibits and other documents listed in the Contract Documents; the General Conditions; other documents listed in Article 8 of this Agreement; and written modifications, amendments and Change Orders to the Contract issued after execution of this Agreement.

2.2. Contract is complete and integrated agreement. The Contract represents the entire, complete, and integrated agreement between the parties and supersedes prior negotiations, representations or agreements, either written or oral. No oral representations or other agreements have been made by the parties except as specifically established in the Contract.

2.3 Contract is between only Owner and Contractor. The Contract Documents shall not be construed to create a contractual relationship of any kind between any Persons other than Owner and Contractor.

Article 3
Definitions

3.1 Terms, words and phrases to have ordinary meanings. Terms, words and phrases used in the Contract Documents shall have the meanings given them in this Agreement and in the General Conditions or, if not defined, in a manner consistent with construction industry standards. In the event of any inconsistency in such definitions, the definitions in this Agreement shall control.

3.2 Construction Documents. The Construction Documents are identified in the General Conditions and other Contract Documents as Drawings and Specifications. The Construction Documents do not include shop drawings or other Submittals.

3.3 Contractor. "Contractor" is the Person identified as such in the Agreement and General Conditions. Contractor must be licensed, bonded, and insured as a contractor in the State of Washington, and must legally be permitted to do business. Contractor's authorized representative, including its Designated Representative, shall be authorized to act on Contractor's behalf with respect to the Project.

3.4 General Conditions modified. Section 4.03E of the General Conditions is hereby modified to clarify that Contractor and Owner may agree on the number of copies of Submittals to be provided to Owner. If no such agreement is reached, Contractor shall submit five copies.

Article 4
Notice to Proceed and Substantial Completion

4.1 Notice to Proceed. The date of Notice to Proceed will be specified in a written Notice issued by Owner. Owner may issue separate written authorizations to proceed for different portions of the Work.

4.2 Contract Time measured from date of commencement. The Contract Time shall be measured from the Notice to Proceed date to the contractual date of Substantial Completion established in Section 4.3, subject to adjustments as provided in the Contract Documents. Time is of the essence in completion of the Work.

4.3 Substantial Completion and Final Completion. Contractor shall achieve Substantial Completion of the Work by June 1, 2023, subject to adjustments as provided in the Contract Documents, and shall achieve Final Completion not later than Thirty (30) Days thereafter. Contractor represents to Owner that the Contract Time is adequate for full performance of the Work. Contractor shall also achieve any interim milestones and phasing requirements set forth in the Contract Documents.

4.4 Liquidated damages. Owner will assess, and Contractor will be responsible for, liquidated damages in the amount of One hundred sixty-six dollars and no cents($ 166.00) per Day for each Day beyond the contractual date for Substantial Completion that Substantial Completion is not timely achieved, and subsequently One hundred twenty-two dollars and no cents ($122.00) per Day for each Day beyond the time period established in Section 4.3 that Final Completion of the entire Work is not achieved. Contractor and Owner agree that the liquidated damages amounts are not penalties and are a reasonable estimation of actual damages to Owner, as of this date of Agreement, based on the inherent uncertainty and difficulty in calculating and quantifying damages caused by delays in the construction of university facilities.

Article 5
Contract Sum

5.1 Contract Sum. For Contractor's performance of the Contract, Owner shall pay to Contractor the Contract Sum of _____ _____ dollars ($_____), subject to additions and deductions for changes in the Work as provided in the Contract Documents. The Contract Sum includes by way of example and not limitation all costs of construction; general conditions; all taxes except Washington State sales tax due on the Contract Sum; Contractor's contingency; any approved Allowances; all insurance; overhead; and Contractor's fee.

5.2 Alternates. The Contract Sum is based upon the following alternates, if any, which are described in the Contract Documents and are hereby accepted by Owner:

Alternate Number	Description	Price ($0.00)
None		

5.3 Unit Prices. Any Unit Prices are as follows:

Description	Units	Price ($0.00)
None		

Unit Prices as set forth in the Contract Documents are "all in." They include all material, equipment, labor, delivery, installation, and Subcontractor costs, any overhead and profit not included in the fee, and any other costs or expenses in connection with, or incidental to, the performance of that portion of the Work to which

such Unit Prices apply.

5.4 Allowances. Allowances included in the Contract Sum are as follows:

Allowance	Amount	Included Items
None		

Allowances may be included in the Contract Sum due to uncertainty in scope, price and/or quantity at the time this Agreement is executed. Whenever actual costs are more or less than an allowance, the Contract Sum will be appropriately adjusted. Contractor must provide Owner with written notice of its intent to expend an allowance amount (providing Owner with the opportunity to approve or reject the cost) before expending an allowance amount.

5.5 Changes in the Work.

5.5.1 Owner may, without invalidating the Contract, order changes in the Work consisting of additions, deletions or other revisions. Owner shall issue such changes in writing.

5.5.2 Adjustments of the Contract Sum and/or Contract Time on account of changes in the Work may be determined by any of the methods listed in the General Conditions.

Article 6
Payments

6.1 Applications for Payment.

6.1.1 The Contract Documents detail the requirements for Applications for Payment. Based upon Applications for Payment that Contractor submits to Owner, Owner shall make progress payments to Contractor on account of the Contract Sum.

6.2 Progress Payments.

6.2.1 Subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows and in accordance with Section 01 29 00, Applications for Payment:

.1 Take that portion of the Contract Sum properly allocable to completed Work as determined by multiplying the percentage of completion of each portion of the Work by the share of the Contract Sum allocated to that portion in the Schedule of Values. Pending final determination of the cost to Owner of changes in the Work, amounts not in dispute may be included as provided in the General Conditions unless Owner requires that actual cost records be provided;

.2 Add that portion of the Contract Sum properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction (or, if approved in advance by Owner, suitably stored and insured off the site at a location agreed upon in writing);

.3 Subtract the aggregate sum of previous payments made by Owner;

.4 Subtract amounts, if any, for which Owner has withheld payment; and

.5 Subtract the statutory retainage of five percent (5%) of the above amount as a fund for the protection and payment of the claims of any Person arising out of the Work and the State of Washington with respect to taxes.

6.3 Final Payment.

6.3.1 Final payment, constituting the entire unpaid balance of the Contract Sum, less retainage, shall be made by Owner to Contractor no later than 30 Days after Contractor has fully performed the Contract and Final Completion has occurred (except for Contractor's responsibility to correct non-conforming Work discovered after final payment or to satisfy other requirements, if any, that extend beyond final payment), and Contractor has submitted a final Application for Payment.

6.3.2 Owner shall release retainage to Contractor in accordance with Chapter 60.28 RCW and the Contract Documents.

Article 7
Miscellaneous Provisions

7.1 Designated Representatives.

7.1.1 Owner's Designated Representative, designated below, shall be authorized to act on Owner's behalf with respect to the Project:

Craig Cole	Jason Harper
Executive Director	Construction Manager, Lead
Facilities Services	Facilities Services, Capital

7.1.2 Contractor's Designated Representative, identified below, shall be authorized to act on Contractor's behalf with respect to the Project:

_____

_____

_____

7.1.3 Neither Owner's nor Contractor's Designated Representatives shall be changed without 10 Days' written notice to the other party.

7.2 Interest. Payments due and unpaid under the Contract Documents shall bear interest as specified by RCW 39.76, not to exceed the Bank of America prime plus two percent (2%) per annum.

7.3 Quality control and assurance and Owner's right to inspect the Work: Contractor shall develop and submit an overall Quality Control and Assurance Plan to ensure that the Work is inspected by qualified members of Contractor's staff or third parties. The Quality Control and Assurance Plan must be acceptable to Owner. Owner expressly reserves the right to inspect any and all portions of the Work at any time during the Project. Contractor shall provide access to the Work as needed by Owner or its representatives, including the use of scaffolding, platforms, or lifts. All corrections or observations noted by Owner shall be logged by Contractor for correction, tracking and documentation to the satisfaction of Owner.

7.4 Contractor to actively manage and supervise Work. Contractor shall review and inspect the Work of Subcontractors on a regular basis for defects and deficiencies in their Work and for conformance with the Construction Documents and other Contract Documents, and shall stop the Work of Subcontractors, if necessary. Contractor shall provide notification at regularly scheduled progress meetings of any major defects or deficiencies and recommend remedial action.

7.5 Use of Third Party Neutral. Owner and Contractor intend to utilize a Third Party Neutral to assist in addressing and resolving disputes that may arise during the Project. The Third Party Neutral will be jointly engaged and will have the roles and responsibilities set forth in a Third Party Neutral Agreement, which shall be established in accordance with Section 00 80 10, Third Party Neutral.

Article 8
Enumeration of the Contract Documents

8.1 The Contract Documents. The Contract Documents, except for modifications issued after execution of this Agreement, are enumerated as follows:

8.1.1 This executed Agreement, any attached Exhibits and other documents listed in this Agreement.

8.1.2 The General Conditions for Washington State Facility Construction with Washington State University Amendments, and any Supplementary Conditions of the Contract.

8.1.3 The Addenda, if any, are as follows:

Number	Date	Pages

8.1.4 Other documents, if any, forming part of the Contract Documents are as follows:

See Contract Documents.
Department of Labor and Industries Prevailing Wage Rates.

OWNER:
WASHINGTON STATE UNIVERSITY

(Signature) (Date)

(Printed Name)
Vice President and Chief Financial Officer
Finance and Administration

CONTRACTOR:
FIRM NAME
WA CONTRACTOR LICENSE NUMBER

(Signature) (Date)

(Printed Name)
(Title)

END OF SECTION 00 50 00

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WSU amendments to the Washington State Facility Construction
General Conditions are identified by a bar on the right hand side of modified paragraphs

PART 1 - GENERAL PROVISIONS

1.01 DEFINITIONS

A. "Application for Payment" means a written request submitted by Contractor to Owner for payment of Work completed in accordance with the Contract Documents and approved Schedule of Values, supported by such substantiating data as Owner may require.

B. "Architect," "Engineer," or "A/E" means a person or entity lawfully entitled to practice architecture or engineering, representing Owner within the limits of its delegated authority.

C. An "Allowance" is an amount included in the Contract Sum for a stated part of the Work that is not fully defined and/or quantified at the time the Contract Sum is established. When that part of the Work is adequately defined and/or quantified, the Contract Sum will be adjusted to account for the difference between the Allowance and the actual cost of the item. Following the adjustment, that part of the Work will no longer be an Allowance item. Although not capitalized in Section 5.02B, "allowance" shall mean "Allowance."

D. "Change Order" means a written instrument signed by Owner and Contractor stating their agreement upon all of the following: (1) a change in the Work; (2) the amount of the adjustment in the Contract Sum, if any, and (3) the extent of the adjustment in the Contract Time, if any.

E. "Claim" means Contractor's exclusive remedy for resolving disputes with Owner arising out of or relating to the Contract Documents or the breach thereof or requesting an adjustment in the Contract Sum or Contract Time, as more fully set forth in Part 8. As used in the Contract Documents, the exclusive meaning of "equitable adjustment" is the ability of Contractor to follow the contractual dispute resolution process in Part 8, including the requirement for submitting a timely Notice, substantiation, and Claim.

F. The "Contract" is the agreement between Owner and Contractor and is formed by the Contract Documents. The Contract represents the entire and integrated agreement between Owner and Contractor and supersedes prior negotiations, representations or agreements, either written or oral.

G. "Contract Award Amount" is the sum of the Base Bid and any accepted Alternates, if any, for Design-Bid-Build projects and is the accepted initial Guaranteed Maximum Price for Design-Build and GC/CM projects.

H. "Contract Documents" means the General Conditions, modifications to the General Conditions, Supplemental Conditions, Agreement, Drawings and Specifications, and all addenda and modifications thereof.

I. "Contract Sum" is the total amount payable by Owner to Contractor for performance of the Work in accordance with the Contract Documents, including all taxes imposed by law and properly chargeable to the Work, except Washington State sales tax.

J. "Contract Time" is the number of Days or other time period allotted in the Contract Documents from the Notice to Proceed for achieving Substantial Completion of the Work.

K. "Contractor" means the person or entity who has agreed with Owner to perform the Work in accordance with the Contract Documents.

L. "Day(s)" means calendar day(s) unless otherwise specified.

M. "Drawings" are the graphic and pictorial portions of the Contract Documents showing the design, location, and dimensions of the Work, and may include plans, elevations, sections, details, schedules, and diagrams.

N. "Final Acceptance" means the written acceptance of the Work by Owner, as more fully set forth in Section 6.08B.

O. "Final Completion" means that the Work is fully and finally complete in accordance with the Contract Documents and Contractor has submitted its final Application for Payment, as more fully set forth in Section 6.09A.

P. "Force Majeure" means those acts entitling Contractor to request an equitable adjustment in the Contract Time, as more fully set forth in paragraph 3.05A.

Q. "Notice" means a written notice which has been delivered in person to the individual or a member of the firm or entity or to an officer of the corporation for which it was intended or, if delivered or sent by registered or certified mail, to the last business address known to the party giving notice. Although not capitalized in the following provisions, "notice" shall mean "Notice" in Sections 3.03B, 3.03C, 3.06A, 5.01D, 5.02C, 5.03, 5.09A, 5.10A, 5.15A, 5.16F, 5.17, 9.01A, 9.02A, and 9.02B.

R. "Notice to Proceed" means a written Notice from Owner to Contractor that permits pre-construction and construction activities to commence upon specified terms and defines the date on which the Contract Time begins to run.

S. "Owner" means the Washington State University Board of Regents, which has the authority to enter into, administer, and/or terminate the Work in accordance with the Contract Documents. Owner shall designate in writing a Representative who shall have authority to bind Owner with respect to all matters requiring Owner's approval or authorization. A/E does not have such authority.

T. "Person" means a corporation, partnership, business association of any kind, trust, company, or individual.

U. "Prior Occupancy" means Owner's use of all or parts of the Project before Substantial Completion, as more fully set forth in Section 6.08A.

V. "Progress Schedule" means a schedule of the Work, in a form satisfactory to Owner, as further set forth in Section 3.02.

W. "Project" means the total construction of which the Work performed in accordance with the Contract Documents may be the whole or a part and which may include construction by Owner or by separate contractors.

X. "Project Record" means the separate set of Drawings and Specifications as further set forth in paragraph 4.02A.

Y. "Schedule of Values" means a written breakdown allocating the total Contract Sum to each principal category of Work, in such detail and format as requested by Owner.

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

AA. "Subcontract" means a contract between Contractor and a Subcontractor for the purpose of obtaining supplies, materials, equipment, work or services of any kind for or in connection with the Work. Although not capitalized in the following provisions, "subcontract" shall mean "Subcontract" in Sections 5.10A, 5.20E, 9.01B, and 9.02B.

BB. "Subcontractor" means any Person of any tier, other than Contractor, who agrees to furnish or furnishes by contract with, or through Contractor, any supplies, materials, equipment, or services of any kind in connection with the Work. The term "Subcontractor" does not include a separate contractor or subcontractors of a separate contractor. Although not capitalized in the following provisions, "subcontractor" shall mean "Subcontractor" in Sections 5.04B, 5.04C, 5.04G, 5.20A, and 5.21B.

CC. "Substantial Completion" means that stage in the progress of the Work (or portion of the Work designated and approved by Owner) when the construction is sufficiently complete, in accordance with the Contract Documents, so that Owner can fully occupy or utilize the Work (or portion designated by Owner) for its intended use, as more fully set forth in Section 6.07. There may be separate dates of Substantial Completion specified in the Contract Documents for various phases or portions of the Work.

DD. "Work" means the construction and services required by the Contract Documents, and includes, but is not limited to, labor, materials, supplies, equipment, services, permits, and the manufacture and fabrication of components, performed, furnished, or provided in accordance with the Contract Documents. Although not capitalized in the following provisions, "work" shall mean "Work" in Sections 3.02D, 5.04B, 5.04C, 5.07D, 5.12A, 6.02 and 7.02A.

EE. A "Work Directive" ("WD") is a binding written order prepared by Owner that directs Work prior to total agreement on adjustment, if any, in the Contract Sum or Contract Time, or both.

FF. "Work Site" means the space identified and circumscribed on construction documents. The work site is controlled by the Contractor and the Contractor is responsible for compliance to regulatory requirements within the circumscribed area. Changes to the work site shall be submitted by Contractor and approved by Owner.

1.02 ORDER OF PRECEDENCE

Any conflict or inconsistency in the Contract Documents shall be resolved by giving the documents precedence in the following order, with a revision to a Contract Document having precedence over the original document and a later document having precedence over an earlier document:

1. Signed Agreement, with any Change Orders having precedence.

2. Supplemental Conditions.

3. Modifications to the General Conditions.

4. General Conditions.

5. Specifications and Drawings. The Specifications and Drawings are complementary and shall have equal precedence. Thus, anything mentioned in the Specifications but not shown on the Drawings, or shown on the Drawings but not mentioned in the Specifications, shall be of like effect as if shown or mentioned in both. If there is any inconsistency between the Specifications and Drawings, Contractor will make an inquiry to Owner to determine how to proceed. Unless otherwise directed, Contractor will provide the better quality or greater quantity of any Work or materials, as reasonably interpreted by Owner, at no change in the Contract Sum or Contract

Time. In case of conflict within the Specifications, provisions in Division 1 shall take precedence over provisions of any other Division. In case of conflict within the Drawings, large scale Drawings shall take precedence over small scale Drawings.

1.03 EXECUTION AND INTENT

Contractor Representations: Contractor makes the following representations to Owner:

1. Contract Sum and Contract Time reasonable: The Contract Sum is reasonable compensation for the Work and the Contract Time is adequate for the performance of the Work, as represented by the Contract Documents;

2. Contractor familiar with project: Contractor has carefully reviewed the Contract Documents, visited and examined the Project site, become familiar with the local conditions in which the Work is to be performed, and satisfied itself as to the nature, location, character, quality and quantity of the Work, the labor, materials, equipment, goods, supplies, work, services and other items to be furnished and all other requirements of the Contract Documents, as well as the surface and subsurface conditions and other matters that may be encountered at the Project site or affect performance of the Work or the cost or difficulty thereof;

3. Contractor financially capable: Contractor is financially solvent, able to pay its debts as they mature, and possesses sufficient working capital to complete the Work and perform Contractor's obligations required by the Contract Documents; and

4. Contractor can complete Work: Contractor is able to furnish the plant, tools, materials, supplies, equipment and labor required to complete the Work and perform the obligations required by the Contract Documents and has sufficient experience and competence to do so.

PART 2 - INSURANCE AND BONDS

2.01 CONTRACTOR'S LIABILITY INSURANCE

General insurance requirements: Prior to commencement of the Work, Contractor shall obtain all the insurance required by the Contract Documents and provide evidence satisfactory to Owner that such insurance has been procured, including but not limited to (1) Certificates of Insurance on ACORD Form 25, and/or ACORD Form 27 or their equivalents, and which shall list any applicable self-insured retentions, (2) the actual costs (expressed as a percentage) of Contractor's liability insurance under Section 2.01A.1 below, (3) applicable endorsements evidencing proof of compliance with the requirements listed below, (4) evidence of State Workers' Compensation coverage, and (5) a copy of any builder's risk policy required by the Contract Documents. All policies, endorsements and certificates must be signed copies and shall contain a provision that policies will not be cancelled without first giving thirty (30) days (or in the event of non-payment of premium, ten (10) days) prior written Notice to Owner. Contractor shall furnish to Owner copies of any subsequently issued endorsements amending, modifying, altering or restricting coverage terms or limits. Review of Contractor's insurance by Owner shall not relieve or decrease the liability of Contractor. Companies writing the insurance to be obtained by Part 2 shall be licensed to do business under Chapter 48 RCW or comply with the Surplus Lines Law of the State of Washington. Contractor shall include in the Contract Sum the cost of all insurance and bond costs required for the Work. Insurance carriers providing insurance shall be acceptable to Owner, and its A. M. Best rating shall be indicated on the insurance certificates.

A. Term of insurance coverage: Contractor shall maintain the following insurance coverage during the Work and for one year after Substantial Completion. Contractor shall also maintain the following insurance coverage during the performance of any corrective Work required by Section 5.16.

1. General Liability Insurance: Commercial General Liability (CGL) on an occurrence-based ISO Form CG 00 01 or broader, including products and completed operations, personal and advertising injury, bodily injury and property damage liability arising from Contractor's operations or Work, including operations or Work Contractor may subcontract or sublet to others.

   The policy shall be purchased from a company or companies lawfully authorized to do business in the State of Washington possessing an A.M. Best's policyholder's rating of A or better and a financial rating of no less than XI.

   Contractor's policy shall be designated primary and non-contributory to Owner's policies, and shall include a waiver of subrogation against Owner. Any self-insured retentions or deductibles must be disclosed and approved by Owner, and Contractor agrees to be responsible for payment of any and all self-insured retentions or deductibles.

2. Automobile Liability Insurance: Automobile liability on ISO Form CA 00 01 covering Code 1 (any auto).

3. Stop Gap Liability Insurance for damages because of bodily injuries to Contractor's employees.

B. Industrial Insurance compliance: Contractor shall comply with the Washington State Industrial Insurance Act and, if applicable, the Federal Longshoremen's and Harbor Workers' Act and the Jones Act.

C. Insurance to protect for the following: All insurance coverages shall protect against claims for damages for personal and bodily injury or death, as well as claims for property damage, which may arise from operations in connection with the Work whether such operations are by Contractor or any Subcontractor.

D. Owner as Additional Insured: All insurance coverages shall be endorsed to include Owner, its officers, and employees, and any required governmental agencies as additional named insureds with coverage at least as broad as ISO Forms CG 20 10, CG 20 37, and CA 20 48, with no self-insured retentions applicable to the additional insureds.

E. Subcontractor Coverage: Contractor shall ensure and require that Subcontractors have insurance coverage to cover bodily injury and property damage on all operations and all vehicles owned or operated by Subcontractors. Subcontractors shall name Contractor and Owner, any required governmental agencies, and others designated in the Contract Documents as well as their officers and employees, as additional insureds and give at least thirty (30) Days' Notice of cancellation.

2.02 COVERAGE LIMITS

Insurance amounts: The coverage limits shall be not less than the amounts specified in the Agreement; if limits are not specified in the Agreement, coverage limits shall be not less than as follows:

A. $1,000,000 per occurrence for bodily injury, property damage, personal and advertising injury.

B. $2,000,000 general aggregate to apply separately to each project or location.

C. $2,000,000 annual aggregate for products and completed operations.

D. $1,000,000 combined single limit each automobile accident or loss.

E. $1,000,000 per accident for bodily injury or occupational disease of Contractor's employees

Coverages and Minimums: Owner's review, specification or approval of the insurance in this Contract or of its coverage or amount shall not relieve or decrease the liability of Contractor under the Contract Documents or otherwise. Coverages are the minimum to be provided and are not limitations of liability under the Contract, indemnification, or applicable law provisions. Contractor may, at its expense, purchase larger coverage amounts.

2.03 PROOF OF INSURANCE COVERAGE

A. Certificate & endorsements required: Prior to commencement of the Work, Contractor shall furnish to Owner completed certificates of insurance coverage and endorsements evidencing compliance with the additional insured, cancellation, and waiver of subrogation requirements..

B. List Project info: All insurance certificates shall name Owner's Project number and Project title.

C. Policy: In the event of a claim or loss, Contractor shall promptly provide Owner with a complete copy of all applicable policies.

2.04 PAYMENT AND PERFORMANCE BONDS

Conditions for bonds: Payment and performance bonds for 100% of the Contract Award Amount, plus Washington State sales tax, shall be furnished for the Work, using the current version of the Payment Bond and Performance Bond form published by and available from the American Institute of Architects (AIA) – form A312. No payment or performance bond is required if the Contract Sum is $150,000 or less and Contractor requests and the Owner agrees that Owner may, in lieu of the bond, retain 10% of the Contract Sum for the period specified in RCW 39.08.010.

2.05 ALTERNATIVE SURETY

When alternative surety required: Contractor shall promptly furnish payment and performance bonds from an alternative surety if:

A. Owner has a reasonable objection to the surety; or

B. Any surety fails to furnish reports on its financial condition if required by Owner.

2.06 BUILDER'S RISK

A. Owner to buy builder's risk insurance: Owner shall purchase and maintain builder's risk insurance in the amount of the Contract Sum, including all Change Orders, for the Work on a replacement cost basis until Substantial Completion. For projects not involving new building construction, an "Installation Floater" is an acceptable substitute for the builder's risk insurance. The insurance shall cover the interests of Owner, Contractor, and any Subcontractors, as their interests may appear.

B. Losses covered: Builder's risk insurance shall be placed on an "all risk" basis or equivalent policy form and insure against the perils of fire and extended coverage and physical loss or damage including theft, vandalism, malicious mischief, collapse, false work, flood, wind, temporary buildings, earthquake, debris removal including demolition, and shall cover reasonable compensation for A/E's services and expenses required as a result of an insured loss. Losses up to the deductible amount shall be the responsibility of Contractor.

C. Waiver of subrogation rights: Owner and Contractor waive all subrogation rights against each other, any Subcontractors, A/E, A/E's subconsultants, separate contractors described in Section 5.19, if any, and any of their subcontractors, for damages caused by fire or other perils to the extent covered by property insurance obtained pursuant to this Section 2.06 or other property insurance applicable to the Work, except such rights as they have to proceeds of such insurance held by Owner as fiduciary. The policies shall provide such waivers of subrogation by endorsement or otherwise. A waiver of subrogation shall be effective to a Person or entity even though that Person or entity would otherwise have a duty of indemnification, contractual or otherwise, did not pay the insurance premium directly or indirectly, and whether or not the Person or entity had an insurable interest in the property damaged.

PART 3 - TIME AND SCHEDULE

3.01 PROGRESS AND COMPLETION

Contractor to meet schedule: Contractor shall diligently prosecute the Work, with adequate forces, achieve Substantial Completion within the Contract Time, and achieve Final Completion within the time period specified in the Contract Documents. If Contractor fails to perform in a timely manner in accordance with the Contract Documents and, through the fault of Contractor or Subcontractor(s), fails to meet the Progress Schedule, Contractor shall be in default and shall take such steps as may be necessary to immediately improve its progress without change in the Contract Sum or Contract Time.

3.02 CONSTRUCTION SCHEDULE

A. Preliminary Progress Schedule: Unless otherwise provided in Division 1, Contractor shall, within 14 Days after issuance of the Notice to Proceed, submit a preliminary Progress Schedule consistent with the requirements of the Contract Documents. The Progress Schedule shall not exceed time limits specified by the Contract Documents, shall be revised at appropriate intervals as required by the conditions of the Work, and shall show the sequence in which Contractor proposes to perform the Work, and the dates on which Contractor plans to start and finish major portions of the Work, including dates for submission of Submittals per Section 4.03, which shall be coordinated with the Progress Schedule and identify dates for Owner review, and for acquiring materials and equipment.

B. Form of Progress Schedule: Unless otherwise provided in Division 1, the Progress Schedule shall be in the form of a bar chart, or a critical path method analysis, as specified by Owner. The preliminary Progress Schedule may be general, showing the major portions of the Work, with a more detailed Progress Schedule submitted as directed by Owner.

C. Owner comments on Progress Schedule: Owner shall return comments on the preliminary Progress Schedule to Contractor within 14 Days of receipt. Review by Owner of Contractor's schedule does not constitute an approval or acceptance of Contractor's construction means, methods, logic or sequencing, or its ability to complete the Work within the Contract Time. Contractor shall revise and resubmit its schedule, as necessary. Owner may withhold a portion of progress payments until a Progress Schedule has been submitted that meets the requirements of this Section 3.02.

D. Monthly updates and compliance with Progress Schedule: Contractor shall utilize and comply with the Progress Schedule. On a monthly basis, or as otherwise directed by Owner, Contractor shall submit an updated Progress Schedule at its own expense to Owner indicating actual progress. If, in the opinion of Owner, Contractor is not in conformance with the Progress Schedule for reasons other than acts of Force Majeure as identified in Section 3.05, Contractor shall take such steps as are necessary to bring the actual completion dates of its work activities into conformance with the Progress Schedule, and if directed by Owner, Contractor shall submit a

corrective action plan or revise the Progress Schedule to reconcile with the actual progress of the Work.

E. Contractor to notify Owner of delays: Contractor shall perform the Work in accordance with the most recent Progress Schedule submitted to Owner. Contractor shall promptly notify Owner in writing of any actual or anticipated event that is delaying or could delay achievement of any milestone or performance of any critical path activity of the Work. Contractor shall indicate the expected duration of the delay, the anticipated effect of the delay on the Progress Schedule, and the action being or to be taken to correct the problem. Provision of such Notice does not relieve Contractor of its obligation to complete the Work within the Contract Time.

3.03 OWNER'S RIGHT TO SUSPEND THE WORK FOR CONVENIENCE

A. Owner may suspend Work: Owner may, at its sole discretion, order Contractor, in writing, to suspend all or any part of the Work for up to 90 Days, or for such longer period as mutually agreed.

B. Compliance with suspension; Owner's options: Upon receipt of a written notice suspending the Work, Contractor shall immediately comply with its terms and take all reasonable steps to minimize the incurrence of cost of performance directly attributable to such suspension. Within a period up to 90 Days after the notice is delivered to Contractor, or within any extension of that period to which the parties shall have agreed, Owner shall either:

1. Cancel the written notice suspending the Work; or

2. Terminate the Work covered by the notice as provided in the termination provisions of Part 9.

C. Resumption of Work: If a written notice suspending the Work is cancelled or the period of the notice or any extension thereof expires, Contractor shall resume Work.

D. Equitable Adjustment for suspensions: Contractor shall be entitled to an equitable adjustment in the Contract Time, or Contract Sum, or both, for increases in the time or cost of performance directly attributable to such suspension, provided Contractor complies with all requirements set forth in Part 7.

3.04 OWNER'S RIGHT TO STOP AND/OR CARRY OUT THE WORK FOR CAUSE

A. Owner may stop Work for Contractor's failure to perform: If Contractor fails or refuses to perform its obligations in accordance with the Contract Documents, Owner may order Contractor, in writing, to stop the Work, or any portion thereof, until Owner has accepted satisfactory corrective action.

B. Owner may carry out the Work after Contractor's failure to perform: If Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a 14-Day period after receipt of written Notice from Owner to commence and continue to make reasonable progress toward the correction of such default or neglect with diligence and promptness, Owner may, without prejudice to other remedies Owner may have, correct such deficiencies, and an appropriate Change Order shall be issued deducting from payments then or thereafter due Contractor the reasonable cost of correcting the deficiencies, including Owner's expenses and compensation for A/E's additional services made necessary by the default, neglect or failure. If payments then or thereafter due Contractor are not sufficient to cover such amounts, Contractor shall pay the difference to Owner.

C. No equitable adjustment for Contractor's failure to perform: Contractor shall not be entitled to an equitable adjustment in the Contract Time or Contract Sum for any increased cost or time of performance attributable to Contractor's failure or refusal to perform or from any reasonable remedial action taken by Owner based upon such failure.

3.05 DELAY

A. Force Majeure actions not a default; Force Majeure defined: Any delay in or failure of performance by Owner or Contractor shall not constitute a default if and to the extent the cause for such delay or failure of performance was unforeseeable and beyond the control of the party. Acts of Force Majeure include, but are not limited to:

1. Acts of God or the public enemy;

2. Acts or omissions of any government entity not the fault of Owner or Contractor;

3. Fire or other casualty for which Contractor is not responsible;

4. Quarantine or epidemic;

5. Industry-wide strike or defensive lockout;

6. Unusually severe weather conditions which could not have been reasonably anticipated; and

7. Unusual delay in receipt of supplies or products which were ordered and expedited and for which no substitute reasonably acceptable to Owner was available.

    a. "Unusually severe weather" shall mean weather conditions that are abnormal for the period of time for which Force Majeure is claimed, that could not reasonably have been anticipated or avoided, and that had an adverse effect on the Progress Schedule. Neither the Contract Time nor the Contract Sum will be adjusted for normal inclement weather or if the Work was behind schedule (unless behind schedule for a reason not the responsibility of the Contractor) at the time the unusually severe weather occurred. The Contractor shall be entitled to a change in the Contract Time only (but not a change in the Contract Sum) if the Contractor can substantiate to the reasonable satisfaction of the Owner that there was unusually severe weather as compared to normal using a ten (10) year average of accumulated record mean values from climatological data compiled by the U.S. Department of Commerce National Oceanic and Atmospheric Administration for the locale closest to the Project, and that the abnormal inclement weather actually impacted and extended the critical path of the Work. Unusual is defined as a 10-year weather event of either or both precipitation or temperature extremes that fall outside the upper and lower ranges within a 10-year periodicity

B. Contract Time adjustment for Force Majeure: Contractor shall be entitled to an equitable adjustment in the Contract Time for changes in the time of performance directly attributable to an act of Force Majeure, provided it makes a request for equitable adjustment. Contractor shall not be entitled to an adjustment in the Contract Sum resulting from an act of Force Majeure.

C. Contract Time or Contract Sum adjustment if Owner at fault: Contractor shall be entitled to an equitable adjustment in Contract Time, and may be entitled to an equitable adjustment in

Contract Sum, if the cost or time of Contractor's performance is changed due to the fault or negligence of Owner, provided the Contractor makes a request for equitable adjustment.

D. No Contract Time or Contract Sum adjustment if Contractor at fault: Contractor shall not be entitled to an adjustment in Contract Time or in the Contract Sum for any delay or failure of performance to the extent such delay or failure was caused by Contractor or anyone for whose acts Contractor is responsible.

E. Contract Time adjustment only for concurrent fault: To the extent any delay or failure of performance was concurrently caused by the Owner and Contractor, Contractor shall be entitled to an adjustment in the Contract Time for that portion of the delay or failure of performance that was concurrently caused, provided it makes a request for equitable adjustment, but shall not be entitled to an adjustment in Contract Sum.

F. Contractor to mitigate delay impacts: Contractor shall make all reasonable efforts to prevent and mitigate the effects of any delay, whether occasioned by an act of Force Majeure or otherwise. Contractor shall not recover damages, an equitable adjustment or an increase in the Contract Sum or Contract Time from Owner where Contractor could have reasonably avoided the delay by the exercise of due diligence.

G. Types of damages permitted: If Contractor and its Subcontractors are entitled to a change in the Contract Sum, the amount of the change shall be the actual costs incurred by the Contractor and Subcontractors directly related to the change calculated in accordance with Section 7.02. Contractor and its Subcontractors shall not otherwise (not reflected by the actual costs incurred as calculated in accordance with Section 7.02) be entitled to damages arising out of actual or alleged loss of efficiency; morale, fatigue, attitude, or labor rhythm; constructive acceleration; home office overhead; expectant underrun; trade stacking; reassignment of workers; rescheduling of Work, concurrent operations; dilution of supervision; learning curve; beneficial or joint occupancy; logistics; ripple; season change; extended overhead; profit upon damages for delay; impact damages including cumulative impacts; or similar damages. Any effect that such alleged events may have on Contractor or its Subcontractors, to the extent not otherwise paid, is subsumed in and fully compensated through the percentage Fee on Change Orders paid through Section 7.02A.3.e and any liquidated damages paid hereunder.

3.06 NOTICE TO OWNER OF LABOR DISPUTES

A. Contractor to notify Owner of labor disputes: If Contractor has knowledge that any actual or potential labor dispute is delaying or threatens to delay timely performance in accordance with the Contract Documents, Contractor shall immediately give notice, including all relevant information, to Owner.

B. Pass through notification provisions to Subcontractors: Contractor agrees to insert a provision in its Subcontracts and to require insertion in all sub-subcontracts, that in the event timely performance of any such contract is delayed or threatened by delay by any actual or potential labor dispute, the Subcontractor or Sub-subcontractor shall immediately notify the next higher tier Subcontractor or Contractor, as the case may be, of all relevant information concerning the dispute.

3.07 DAMAGES FOR FAILURE TO ACHIEVE TIMELY COMPLETION

A. Liquidated Damages:

1. Reason for Liquidated Damages: Timely performance and completion of the Work is essential to Owner and time limits stated in the Contract Documents are of the essence.

Owner will incur serious and substantial damages if Substantial Completion of the Work does not occur within the Contract Time. However, it would be difficult if not impossible to determine the exact amount of such damages. Consequently, provisions for liquidated damages are included in the Contract Documents.

2. Calculation of Liquidated Damages amount: The liquidated damage amounts set forth in the Contract Documents will be assessed not as a penalty, but as liquidated damages for breach of the Contract Documents. This amount is fixed and agreed upon by and between the Contractor and Owner because of the impracticability and extreme difficulty of fixing and ascertaining the actual damages the Owner would in such event sustain. This amount shall be construed as the actual amount of damages sustained by the Owner, and may be retained by the Owner and deducted from periodic payments to the Contractor.

3. Contractor responsible even if Liquidated Damages assessed: Assessment of liquidated damages shall not release Contractor from any obligations or liabilities pursuant to the Contract Documents. If Contractor substantially fails to perform in a timely manner in accordance with the Contract Documents and, through the fault of Contractor or Subcontractor(s), fails to achieve Substantial Completion within the Contract Time, Contractor shall be in default.

B. Actual Damages: If no liquidated damages are established, actual damages may be assessed for failure to achieve both Substantial Completion and Final Completion within the time provided. Actual damages will be calculated on the basis of direct architectural, administrative, and other related costs attributable to the Project from the date when Substantial and/or Final Completion should have been achieved, as applicable. Owner may offset these costs against any payment due Contractor.

PART 4 - SPECIFICATIONS, DRAWINGS, AND OTHER DOCUMENTS

4.01 DISCREPANCIES AND CONTRACT DOCUMENT REVIEW

A. Specifications and Drawings are basis of the Work: The intent of the Specifications and Drawings is to describe a complete Project to be constructed in accordance with the Contract Documents. Contractor shall furnish all labor, materials, equipment, tools, transportation, permits, and supplies, and perform the Work required in accordance with the Drawings, Specifications, and other provisions of the Contract Documents.

B. Parts of the Contract Documents are complementary: The Contract Documents are complementary. What is required by one part of the Contract Documents shall be binding as if required by all. Anything mentioned in the Specifications and not shown on the Drawings, or shown on the Drawings and not mentioned in the Specifications, shall be of like effect as if shown or mentioned in both.

C. Contractor to report discrepancies in Contract Documents: Contractor shall carefully study and compare the Contract Documents with each other and with information furnished by Owner. If, during the performance of the Work, Contractor finds a conflict, error, inconsistency, or omission in the Contract Documents, it shall promptly and before proceeding with the Work affected thereby, report such conflict, error, inconsistency, or omission to A/E in writing.

D. Contractor knowledge of discrepancy in documents – responsibility: Contractor shall do no Work without applicable Drawings, Specifications, and, where required, accepted shop drawings and other Submittals, unless instructed to do so in writing by Owner. If Contractor performs any construction activity, and it knows or reasonably should have known that any of the Contract

Documents contain a conflict, error, inconsistency, or omission, Contractor shall be responsible for the performance and shall bear the cost for its correction.

E. Contractor to perform Work implied by Contract Documents: Contractor shall provide any work or materials the provision of which is clearly implied and is within the scope of the Contract Documents even if the Contract Documents do not mention them specifically.

F. Interpretation questions referred to A/E: Questions regarding interpretation of the requirements of the Contract Documents shall be referred to the A/E.

4.02 PROJECT RECORD

A. Contractor to maintain Project Record Drawings and Specifications: Contractor shall legibly mark in ink on a separate set of the Drawings and Specifications all actual construction, including depths of foundations, horizontal and vertical locations of internal and underground utilities and appurtenances referenced to permanent visible and accessible surface improvements, field changes of dimensions and details, actual suppliers, manufacturers and trade names, models of installed equipment, changes made to the building enclosure, and Change Order Proposals. This separate set of Drawings and Specifications shall be the "Project Record." The Project Record shall include all Architectural, Mechanical, Electrical, Structural and Civil as-built drawings, whether or not any changes occur and shall also include Addenda, Change Orders, WDs and other modifications to the Contract, in good order and marked currently to indicate field changes and selections made during construction, as well as one copy of accepted shop drawings, product data, samples and other required Submittals.

B. Update Project Record weekly and keep on site: The Project Record shall be maintained on the Project site throughout the construction and shall be clearly labeled "PROJECT RECORD." The Project Record shall be available to A/E and Owner at all times. The Project Record shall be updated at least weekly noting all changes and shall be available to Owner at all times.

C. Final Project Record to A/E before Final Acceptance: Contractor shall submit the completed and finalized Project Record to A/E prior to Final Acceptance.

4.03 SUBMITTALS

A. Definition of Submittals: "Submittals" means documents and other information required to be submitted to A/E by Contractor pursuant to the Contract Documents, showing in detail: the proposed fabrication and assembly of structural elements; and the installation (i.e. form, fit, and attachment details) of materials and equipment. Submittals can include, but are not limited to, drawings, diagrams, layouts, schematics, descriptive literature, illustrations, schedules, performance and test data, samples, and similar materials furnished by Contractor to explain in detail specific portions of the Work required by the Contract Documents. For materials and equipment to be incorporated into the Work, Contractor submittal shall include the name of the manufacturer, the model number, and other information concerning the performance, capacity, nature, and rating of the item. When directed, Contractor shall submit all samples at its own expense. Owner may duplicate, use, and disclose Submittals provided in accordance with the Contract Documents.

B. Approval of Submittals by Contractor and A/E: Contractor shall coordinate all Submittals with the Progress Schedule per Section 3.02A, shall review them for accuracy, completeness, and compliance with the Contract Documents, and shall indicate its approval thereon as evidence of such coordination and review. Where required by law, Submittals shall be stamped by an appropriate professional licensed by the state of Washington. Submittals submitted to A/E without evidence of Contractor's approval shall be returned for resubmission. Contractor shall

review, approve, and submit Submittals with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of Owner or separate contractors. Contractor's submittal schedule shall allow a reasonable time for A/E review. A/E will review, approve, or take other appropriate action on the Submittals. Contractor shall perform no portion of the Work requiring submittal and review of Submittals until the respective submittal has been reviewed and the A/E has approved or taken other appropriate action. Owner and A/E shall respond to Submittal with reasonable promptness. Any Work by Contractor shall be in accordance with reviewed Submittals. Submittals made by Contractor which are not required by the Contract Documents may be returned without action.

C. Contractor not relieved of responsibility when Submittals approved: Approval, or other appropriate action with regard to Submittals, by Owner or A/E shall not relieve Contractor of responsibility for any errors or omissions in such Submittals, nor from responsibility for compliance with the requirements of the Contract Documents. Unless specified in the Contract Documents, review by Owner or A/E shall not constitute an approval of the safety precautions employed by Contractor during construction, or constitute an approval of Contractor's means or methods of construction. If Contractor fails to obtain approval before installation and the item or work is subsequently rejected, Contractor shall be responsible for all costs of correction.

D. Variations between Submittals and Contract Documents: Submittals, including product data, samples and similar submissions, are not Contract Documents. If Submittals vary from the requirements of the Contract Documents, Contractor shall describe such variations in writing, separate from the Submittals, at the time it submits the Submittals containing such variations. If Owner approves any such variation, an appropriate Change Order will be issued. If the variation is minor and does not involve an adjustment in the Contract Sum or Contract Time, a Change Order need not be issued; however, the modification shall be approved by Owner in writing and recorded upon the Project Record. Approval for substitutions shall not be sought and shall not be approved through the submission of Submittals.

E. Contractor to submit 5 copies of Submittals: Unless otherwise provided in Division 1, Contractor shall submit to A/E for approval 5 copies of all Submittals. Unless otherwise indicated, 3 sets of all Submittals shall be retained by A/E and 2 sets shall be returned to Contractor.

4.04 ORGANIZATION OF SPECIFICATIONS

Specification organization by trade: Specifications are prepared in sections which conform generally with trade practices. These sections are for Owner and Contractor convenience and shall not control Contractor in dividing the Work among the Subcontractors or in establishing the extent of the Work to be performed by any trade.

4.05 OWNERSHIP AND USE OF DRAWINGS, SPECIFICATIONS, AND OTHER DOCUMENTS

A. A/E, not Contractor, owns Copyright of Drawings and Specifications: The Drawings, Specifications, and other documents prepared by A/E are instruments of A/E's service through which the Work to be executed by Contractor is described. Neither Contractor nor any Subcontractor shall own or claim a copyright in the Drawings, Specifications, and other documents prepared by A/E, and A/E shall be deemed the author of them and will, along with any rights of Owner, retain all common law, statutory, and other reserved rights, in addition to the copyright. All copies of these documents, except Contractor's set, shall be returned or suitably accounted for to A/E, on request, upon completion of the Work.

B. Drawings and Specifications to be used only for this Project: The Drawings, Specifications, and other documents prepared by the A/E, and copies thereof furnished to Contractor, are for use solely with respect to this Project. They are not to be used by Contractor or any Subcontractor on

other projects or for additions to this Project outside the scope of the Work without the specific written consent of Owner and A/E. Contractor and Subcontractors are granted a limited license to use and reproduce applicable portions of the Drawings, Specifications, and other documents prepared by A/E appropriate to and for use in the execution of their Work.

C. License granted to Owner: Contractor and all Subcontractors grant a non-exclusive license to Owner, without additional cost or royalty, to use for its own purposes (including reproduction) all Submittals, together with the information and diagrams contained therein, prepared by Contractor or any Subcontractor. In providing Submittals, Contractor and all Subcontractors warrant that they have authority to grant to Owner a license to use the Submittals, and that such license is not in violation of any copyright or other intellectual property right. Contractor agrees to defend and indemnify Owner pursuant to the indemnity provisions in Section 5.03 and 5.22 from any violations of copyright or other intellectual property rights arising out of Owner's use of the Submittals hereunder, or to secure for Owner, at Contractor's own cost, licenses in conformity with this section.

D. Submittals to be used only for this Project: Submittals prepared by Contractor, Subcontractors of any tier, or its or their equipment or material suppliers, and copies thereof furnished to Contractor, are for use solely with respect to this Project. They are not to be used by Contractor or any Subcontractor of any tier, or material or equipment supplier, on other projects or for additions to this Project outside the scope of the Work without the specific written consent of Owner. The Contractor, Subcontractors of any tier, and material or equipment suppliers are granted a limited license to use and reproduce applicable portions of the Submittals appropriate to and for use in the execution of their Work under the Contract Documents.

E. Electronic Files: If the parties intend to transmit the instruments of service or any other information or documentation in digital form (other than PDF), they shall endeavor to establish necessary protocols governing such transmissions, unless otherwise already provided in the Contract Documents.

PART 5 - PERFORMANCE

5.01 CONTRACTOR CONTROL AND SUPERVISION

A. Contractor responsible for Means and Methods of construction: Contractor shall supervise and direct the Work, using its best skill and attention, and shall perform the Work in a skillful manner. Contractor shall be solely responsible for and have control over construction means, methods, techniques, sequences, and procedures and for coordinating all portions of the Work, unless the Contract Documents give other specific instructions concerning these matters. Contractor shall disclose its means and methods of construction when requested by Owner.

B. Competent superintendent required: Contractor, as soon as practicable after award of the Contract, shall furnish in writing to Owner the name and qualifications of its proposed superintendent. Owner may reply within 14 Days to Contractor in writing stating (1) whether Owner has reasonable objection to the proposed superintendent or (2) that Owner requires additional time to review. Failure of Owner to reply within the 14-Day period shall constitute Notice of no reasonable objection. The superintendent shall not be employed on any other project during the course of the Work. Unless approved by the Owner's representative and only when overseeing projects on the same campus or location where oversite and supervision will not be degraded. Performance of the Work shall be directly supervised by a competent superintendent who shall be in attendance at the Project site during performance of the Work and who has authority to act on behalf of Contractor. Communications given to the superintendent shall be as binding as if given to Contractor. The superintendent must be satisfactory to Owner and shall not be changed without the prior written consent of Owner. Owner may require

Contractor to remove the superintendent from the Work or Project site, if Owner reasonably deems the superintendent incompetent, careless, or otherwise objectionable, provided Owner has first notified Contractor in writing and allowed a reasonable period for transition.

C. Contractor responsible for acts and omissions of self and agents: Contractor shall be responsible to Owner for acts and omissions of Contractor, Subcontractors, and their employees and agents.

D. Contractor to employ competent and disciplined workforce: Contractor shall enforce strict discipline and good order among all of the Contractor's employees and other persons performing the Work. Contractor shall not permit employment of persons not skilled in tasks assigned to them. Contractor's employees shall at all times conduct business in a manner which assures fair, equal, and nondiscriminatory treatment of all persons. Owner may, by written notice, request Contractor to remove from the Work or Project site any employee Owner reasonably deems incompetent, careless, or otherwise objectionable.

E. Contractor to keep project documents on site: Contractor shall keep on the Project site a copy of the Drawings, Specifications, addenda, reviewed Submittals, and permits and permit drawings.

F. Contractor to comply with ethical standards: Contractor shall ensure that its owner(s) and employees, and those of its Subcontractors, comply with the Ethics in Public Service Act RCW 42.52, which, among other things, prohibits state employees from having an economic interest in any public works contract that was made by, or supervised by, that employee. Contractor shall remove, at its sole cost and expense, any of its, or its Subcontractors' employees, if they are in violation of this act.

5.02 PERMITS, FEES, AND NOTICES

A. Contractor to obtain and pay for permits: Unless otherwise provided in the Contract Documents, Contractor shall secure and pay for the building, any land use permits and all other permits, licenses, and inspections necessary for proper execution and completion of the Work. Prior to Final Acceptance, the approved, signed permits shall be delivered to Owner.

B. Allowances for permit fees: If allowances for permits or utility fees are called for in the Contract Documents and set forth in Contractor's bid, and the actual costs of those permits or fees differ from the allowances in the Contract Documents, the difference shall be adjusted by Change Order.

C. Contractor to comply with all applicable laws: Contractor shall comply with and give notices required by all federal, state, and local laws, ordinances, rules, regulations, and lawful orders of public authorities applicable to performance of the Work.

D. Taxes: Contractor shall pay sales, consumer, use, business and occupation, income and similar taxes for the Work that are legally enacted when the initial Contract Sum is agreed.

5.03 PATENTS AND ROYALTIES

Payment, indemnification, and notice: Contractor is responsible for, and shall pay, all royalties and license fees. Contractor shall defend, indemnify, and hold Owner harmless from any costs, expenses, and liabilities arising out of the infringement by Contractor of any patent, copyright, or other intellectual property right used in the Work; however, provided that Contractor gives prompt notice, Contractor shall not be responsible for such defense or indemnity when a particular design, process, or product of a particular manufacturer or manufacturers is required by the Contract Documents. If Contractor has reason to believe that use of the required design, process, or product constitutes an infringement of a patent or copyright, it shall promptly notify Owner of such potential infringement.

5.04 PREVAILING WAGES

A. Contractor to pay Prevailing Wages: Contractor shall pay the prevailing rate of wages to all workers, laborers, or mechanics employed in the performance of any part of the Work in accordance with RCW 39.12 and the rules and regulations of the Department of Labor and Industries. The schedule of prevailing wage rates for the locality or localities of the Work, is determined by the Industrial Statistician of the Department of Labor and Industries. It is the Contractor's responsibility to verify the applicable prevailing wage rate.

B. Statement of Intent to Pay Prevailing Wages: Before payment is made by the Owner to the Contractor for any work performed by the Contractor and subcontractors whose work is included in the application for payment, the Contractor shall submit, or shall have previously submitted to the Owner for the Project, a Statement of Intent to Pay Prevailing Wages, approved by the Department of Labor and Industries, certifying the rate of hourly wage paid and to be paid each classification of laborers, workers, or mechanics employed upon the Work by Contractor and Subcontractors. Such rates of hourly wage shall not be less than the prevailing wage rate.

C. Affidavit of Wages Paid: Prior to release of retainage, the Contractor shall submit to the Owner an Affidavit of Wages Paid, approved by the Department of Labor and Industries, for the Contractor and every subcontractor that performed work on the Project.

D. Disputes: Disputes regarding prevailing wage rates shall be referred for arbitration to the Director of the Department of Labor and Industries. The arbitration decision shall be final and conclusive and binding on all parties involved in the dispute as provided for by RCW 39.12.060.

E. Statement with pay application; Post Statements of Intent at job site: Each Application for Payment submitted by Contractor shall state that prevailing wages have been paid in accordance with the prefiled statement(s) of intent, as approved. Copies of the approved intent statement(s) shall be posted on the job site with the address and telephone number of the Industrial Statistician of the Department of Labor and Industries where a complaint or inquiry concerning prevailing wages may be made.

F. Contractor to pay for Statements of Intent and Affidavits: In compliance with chapter 296-127 WAC, Contractor shall pay to the Department of Labor and Industries the currently established fee(s) for each statement of intent and/or affidavit of wages paid submitted to the Department of Labor and Industries for certification.

G. Certified Payrolls: Consistent with WAC 296-127-320, the Contractor and any subcontractor shall submit a certified copy of payroll records if requested.

5.05 HOURS OF LABOR

A. Overtime: Contractor shall comply with all applicable provisions of RCW 49.28 and they are incorporated herein by reference.

5.06 NONDISCRIMINATION

A. Discrimination prohibited by applicable laws: Discrimination in all phases of employment is prohibited by, among other laws and regulations, Title VII of the Civil Rights Act of 1964, the Vietnam Era Veterans Readjustment Act of 1974, Sections 503 and 504 of the Vocational Rehabilitation Act of 1973, the Equal Employment Act of 1972, the Age Discrimination Act of 1967, the Americans with Disabilities Act of 1990, the Civil Rights Act of 1991, Presidential Executive Order 11246, Executive Order 11375, the Washington State Law Against Discrimination, RCW 49.60, and Gubernatorial Executive Order 85-09. These laws and

regulations establish minimum requirements for affirmative action and fair employment practices which Contractor must meet.

B. During performance of the Work:

1. Protected Classes: Contractor shall not discriminate against any employee or applicant for employment because of race, creed, color, national origin, sex, age, marital status, or the presence of any physical, sensory, or mental disability, Vietnam era veteran status, or disabled veteran status, nor commit any other unfair practices as defined in RCW 49.60.

2. Advertisements to state nondiscrimination: Contractor shall, in all solicitations or advertisements for employees placed by or for it, state that all qualified applicants will be considered for employment, without regard to race, creed, color, national origin, sex, age, marital status, or the presence of any physical, sensory, or mental disability.

3. Contractor to notify unions and others of nondiscrimination: Contractor shall send to each labor union, employment agency, or representative of workers with which it has a collective bargaining agreement or other contract or understanding, a notice advising the labor union, employment agency, or workers' representative of Contractor's obligations according to the Contract Documents and RCW 49.60.

4. Owner and State access to Contractor records: Contractor shall permit access to its books, records, and accounts, and to its premises by Owner, and by the Washington State Human Rights Commission, for the purpose of investigation to ascertain compliance with this section of the Contract Documents.

5. Pass through provisions to Subcontractors: Contractor shall include the provisions of this section in every Subcontract.

5.07 SAFETY PRECAUTIONS

A. Contractor responsible for safety: Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the performance of the Work. Contractor shall be solely and completely responsible for conditions of the Project site, including safety of all persons and property, during performance of the Work. Contractor shall maintain the Project site and perform the Work in a manner that meets statutory and common-law requirements for the provision of a safe place to work. This requirement shall apply continuously and not be limited to working hours. Any review by Owner or A/E of Contractor's performance shall not be construed to include a review of the adequacy of Contractor's safety measures in, on or near the site of the Work.

B. Contractor safety responsibilities: In carrying out its responsibilities according to the Contract Documents, Contractor shall protect the lives and health of employees performing the Work and other persons who may be affected by the Work; prevent damage to materials, supplies, and equipment whether on site or stored off-site; and prevent damage to other property at the site or adjacent thereto. Contractor shall comply with all applicable laws, ordinances, rules, regulations, and orders of any public body having jurisdiction for the safety of persons or property or to protect them from damage, injury, or loss; shall erect and maintain all necessary safeguards for such safety and protection; and shall notify owners of adjacent property and utilities when prosecution of the Work may affect them.

C. Contractor to maintain safety records: Contractor shall maintain an accurate record of exposure data on all incidents relating to the Work resulting in death, traumatic injury, occupational disease, or damage to property, materials, supplies, or equipment. Contractor shall immediately report

any such incident to Owner. Owner shall, at all times, have a right of access to all records of exposure.

D. Contractor to provide HazMat training: Contractor shall provide all persons working on the Project site with information and training on hazardous chemicals in their work at the time of their initial assignment, and whenever a new hazard is introduced into their work area.

1. Information. At a minimum, Contractor shall inform persons working on the Project site of:

a. WAC: The requirements of chapter 296-62 WAC, General Occupational Health Standards;

b. Presence of hazardous chemicals: Any operations in their work area where hazardous chemicals are present; and

c. Hazard communications program: The location and availability of written hazard communication programs, including the required list(s) of hazardous chemicals and material safety data sheets required by chapter 296-62 WAC.

2. Training. At a minimum, Contractor shall provide training for persons working on the Project site which includes:

a. Detecting hazardous chemicals: Methods and observations that may be used to detect the presence or release of a hazardous chemical in the work area (such as monitoring conducted by the employer, continuous monitoring devices, visual appearance or odor of hazardous chemicals when being released, etc.);

b. Hazards of chemicals: The physical and health hazards of the chemicals in the work area;

c. Protection from hazards: The measures such persons can take to protect themselves from these hazards, including specific procedures Contractor, or its Subcontractors, or others have implemented to protect those on the Project site from exposure to hazardous chemicals, such as appropriate work practices, emergency procedures, and personal protective equipment to be used; and

d. Hazard communications program: The details of the hazard communications program developed by Contractor, or its Subcontractors, including an explanation of the labeling system and the material safety data sheet, and how employees can obtain and use the appropriate hazard information.

E. Hazardous, toxic or harmful substances: Contractor's responsibility for hazardous, toxic, or harmful substances shall include the following duties:

1. Illegal use of dangerous substances: Contractor shall not keep, use, dispose, transport, generate, or sell on or about the Project site, any substances now or hereafter designated as, or which are subject to regulation as, hazardous, toxic, dangerous, or harmful by any federal, state or local law, regulation, statute or ordinance (hereinafter collectively referred to as "hazardous substances"), in violation of any such law, regulation, statute, or ordinance, but in no case shall any such hazardous substance be stored more than 90 Days on the Project site.

2. Contractor notifications of spills, failures, inspections, and fines: Contractor shall promptly notify Owner of all spills or releases of any hazardous substances which are otherwise required to be reported to any regulatory agency and pay the cost of cleanup. Contractor shall promptly notify Owner of all failures to comply with any federal, state, or local law, regulation, or ordinance; all inspections of the Project site by any regulatory entity concerning the same; all regulatory orders or fines; and all responses or interim cleanup actions taken by or proposed to be taken by any government entity or private party on the Project site.

F. Public safety and traffic: All Work shall be performed with due regard for the safety of the public. Contractor shall perform the Work so as to cause a minimum of interruption of vehicular traffic or inconvenience to pedestrians. All arrangements to care for such traffic shall be Contractor's responsibilities. All expenses involved in the maintenance of traffic by way of detours shall be borne by Contractor.

G. Contractor to act in an emergency: In an emergency affecting the safety of life or the Work or of adjoining property, Contractor is permitted to act, at its discretion, to prevent such threatened loss or injury, and Contractor shall so act if so authorized or instructed.

H. No duty of safety by Owner or A/E: Nothing provided in this Section 5.07 shall relieve Contractor of sole and complete responsibility for safety at the Project site, for sole and complete responsibility for any violation of safety or property protection requirements or the correction thereof, or impose any duty upon Owner or A/E with regard to, or as constituting any express or implied assumption of control or responsibility over, any other safety conditions relating to employees or agents of Contractor or any of its Subcontractors, or the public. Any Notice Owner or A/E gives to Contractor of a safety or property protection violation will not: (1) relieve Contractor of sole and complete responsibility for the violation and the correction thereof, or for sole liability for the consequences of said violation; (2) impose any obligation upon Owner or A/E to inspect or review Contractor's safety program or precautions or to enforce Contractor's compliance with the requirements of this Section 5.07; or (3) impose any continuing obligation upon Owner or A/E to provide such Notice to Contractor or any other persons or entity.

5.08 OPERATIONS, MATERIAL HANDLING, AND STORAGE AREAS

A. Limited storage areas: Contractor shall confine all operations, including storage of materials, to Owner-approved areas.

B. Temporary buildings and utilities at Contractor expense: Temporary buildings (e.g., storage sheds, shops, offices) and utilities may be provided by Contractor only with the consent of Owner and without expense to Owner. The temporary buildings and utilities shall be removed by Contractor at its expense upon completion of the Work.

C. Roads and vehicle loads: Contractor shall use only established roadways or temporary roadways authorized by Owner. When materials are transported in prosecuting the Work, vehicles shall not be loaded beyond the loading capacity recommended by the manufacturer of the vehicle or prescribed by federal, state, or local law or regulation.

D. Ownership and reporting by Contractor of demolished materials: Ownership and control of all materials or facility components to be demolished or removed from the Project site by Contractor shall immediately vest in Contractor upon severance of the component from the facility or severance of the material from the Project site. Contractor shall be responsible for compliance with all laws governing the storage and ultimate disposal. Contractor shall provide Owner with a copy of all manifests and receipts evidencing proper disposal when required by Owner or applicable law.

E. Contractor responsible for care of materials and equipment on-site: Contractor shall be responsible for the proper care and protection of its materials and equipment delivered to the Project site. Materials and equipment may be stored on the premises subject to approval of Owner. When Contractor uses any portion of the Project site as a shop, Contractor shall be responsible for any repairs, patching, or cleaning arising from such use.

F. Contractor responsible for loss of materials and equipment: Contractor shall protect and be responsible for any damage or loss to the Work, or to the materials or equipment until the date of Substantial Completion, and shall repair or replace without cost to Owner any damage or loss that may occur, except damages or loss caused by the acts or omissions of Owner. Contractor shall also protect and be responsible for any damage or loss to the Work, or to the materials or equipment, after the date of Substantial Completion, and shall repair or replace without cost to Owner any such damage or loss that might occur, to the extent such damages or loss are caused by the acts or omissions of Contractor, or any Subcontractor.

5.09 PRIOR NOTICE OF EXCAVATION

A. Excavation defined; Use of locator services: "Excavation" means an operation in which earth, rock, or other material on or below the ground is moved or otherwise displaced by any means, except the tilling of soil less than 12 inches in depth for agricultural purposes, or road ditch maintenance that does not change the original road grade or ditch flow line. Before commencing any excavation, Contractor shall provide notice of the scheduled commencement of excavation to all owners of underground facilities or utilities, through locator services.

5.10 UNFORESEEN PHYSICAL CONDITIONS

A. Notice requirement for concealed or unknown conditions: If Contractor encounters conditions at the site which are subsurface or otherwise concealed physical conditions which differ materially from those indicated in the Contract Documents, or unknown physical conditions of an unusual nature which differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, then Contractor shall give written notice to Owner promptly and in no event later than 7 Days after the first observance of the conditions. Conditions shall not be disturbed prior to such notice.

B. Adjustment in Contract Time and Contract Sum: If such conditions differ materially and cause a change in Contractor's cost of, or time required for, performance of any part of the Work, the Contractor may be entitled to an equitable adjustment in the Contract Time or Contract Sum, or both, provided it makes a request therefore as provided in Part 7.

5.11 PROTECTION OF EXISTING STRUCTURES, EQUIPMENT, VEGETATION, UTILITIES AND IMPROVEMENTS

A. Contractor to protect and repair property: At all times until Owner's occupancy of the Work or a designated portion of the Work, Contractor shall protect the Work from damage, weather, deterioration, theft, vandalism and malicious mischief and shall bear the risk of any uninsured loss or destruction of, or injury or damage to, all materials, equipment, tools, and other items incorporated or to be incorporated in the Work or designated portion, or consumed or used in the performance of the Work or designated portion, including all Work in process and completed Work. Contractor shall protect from damage all existing structures, equipment, improvements, utilities, streets, curbs, walks and vegetation at or near the Project site or on adjacent property of a third party, the locations of which are made known to or should be known by Contractor. Contractor shall repair any damage, including that to the property of a third party, resulting from failure to comply with the requirements of the Contract Documents or failure to exercise reasonable care in performing the Work. If Contractor fails or refuses to repair the damage

promptly, Owner may have the necessary work performed and charge the cost to Contractor. If a governmental authority having jurisdiction requires that the repairing and patching be done with its own labor and/or materials, Contractor shall abide by such regulations, and it shall pay for this work at no additional cost to Owner.

B. Tree and vegetation protection: Contractor shall only remove trees when specifically authorized to do so, and shall protect vegetation that will remain in place.

C. Special site conditions: If, in the course of the Work, Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, Contractor shall immediately suspend any operations that would affect them and shall notify Owner and A/E. Upon receipt of such Notice, Owner shall promptly take any action necessary to obtain governmental authorization required to resume the operations. Contractor shall continue to suspend these operations until otherwise instructed by 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 Part 8.

5.12 LAYOUT OF WORK

A. Advanced planning of the Work: Contractor shall plan and lay out the Work in advance of operations so as to coordinate all work without delay or revision.

B. Layout responsibilities: Contractor shall lay out the Work from Owner-established baselines and bench marks indicated on the Drawings, and shall be responsible for all field measurements in connection with the layout. Contractor shall furnish, at its own expense, all stakes, templates, platforms, equipment, tools, materials, and labor required to lay out any part of the Work. Contractor shall be responsible for executing the Work to the lines and grades that may be established. Contractor shall be responsible for maintaining or restoring all stakes and other marks established.

5.13 MATERIAL AND EQUIPMENT

A. Contractor to provide new and equivalent equipment and materials: All equipment, material, and articles incorporated into the Work shall be new and of the most suitable grade for the purpose intended, unless otherwise specifically provided in the Contract Documents. References in the Specifications to equipment, material, articles, or patented processes by trade name, make, or catalog number, shall be regarded as establishing a standard quality and shall not be construed as limiting competition. Contractor may, at its option, use any equipment, material, article, or process that, in the judgment of A/E and after submittal and approval of a substitute request, is equal to that named in the Specifications, unless otherwise specifically provided in the Contract Documents.

B. Contractor responsible for fitting parts together: Contractor shall do all cutting, fitting, or patching that may be required to complete the Work or to make its several parts fit together properly, or receive or be received by work of others set forth in, or reasonably implied by, the Contract Documents. Contractor shall not damage or endanger any work of Owner or separate contractors by cutting, excavating, or otherwise altering the Work and shall not cut or alter the work of any other contractor unless approved in advance by Owner. Contractor shall restore all areas requiring cutting, fitting and patching to the condition existing prior to the cutting, fitting and patching, unless otherwise required by the Contract Documents.

C. Owner may reject defective Work: Should any of the Work be found defective, or in any way not in accordance with the Contract Documents, this Work, in whatever stage of completion, may be

rejected by Owner. However, neither this authority of Owner nor a decision made either to exercise or not to exercise such authority shall give rise to a duty or responsibility of Owner or its representatives to Contractor, Subcontractors, their agents or employees, or other persons or entities performing portions of the Work.

5.14 AVAILABILITY AND USE OF UTILITY SERVICES

A. Owner to provide and charge for utilities: Owner shall make all reasonable utilities available to Contractor from existing outlets and supplies, as specified in the Contract Documents. Unless otherwise provided in the Contract Documents, the utility service consumed shall be charged to or paid for by Contractor at prevailing rates charged to Owner or, where the utility is produced by Owner, at reasonable rates determined by Owner. Contractor will carefully conserve any utilities furnished.

B. Contractor to install temporary connections and meters: Contractor shall, at its expense and in a skillful manner satisfactory to Owner, install and maintain all necessary temporary connections and distribution lines, together with appropriate protective devices, and all meters required to measure the amount of each utility used for the purpose of determining charges. Prior to the date of Final Acceptance, Contractor shall remove all temporary connections, distribution lines, meters, and associated equipment and materials.

5.15 TESTS AND INSPECTION

A. Contractor to provide for all testing and inspection of Work: Contractor shall maintain an adequate testing and inspection program and perform such tests and inspections as are necessary or required to ensure that the Work conforms to the requirements of the Contract Documents. Contractor shall be responsible for inspection and quality surveillance of all its Work and all Work performed by any Subcontractor. Unless otherwise provided, Contractor shall make arrangements for such tests, inspections, and approvals with an independent testing laboratory or entity acceptable to Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections, and approvals. Contractor shall give Owner timely notice of when and where tests and inspections are to be made. Contractor shall maintain complete inspection records and make them available to Owner.

B. Owner may conduct tests and inspections: Owner may, at any reasonable time, conduct such inspections and tests as it deems necessary to ensure that the Work is in accordance with the Contract Documents. Owner shall promptly notify Contractor if an inspection or test reveals that the Work is not in accordance with the Contract Documents. Unless the subject items are expressly accepted by Owner, such Owner inspection and tests are for the sole benefit of Owner and do not:

1. Constitute or imply acceptance;

2. Relieve Contractor of responsibility for providing adequate quality control measures;

3. Relieve Contractor of responsibility for risk of loss or damage to the Work, materials, or equipment;

4. Relieve Contractor of its responsibility to comply with the requirements of the Contract Documents; or

5. Impair Owner's right to reject defective or nonconforming items, or to avail itself of any other remedy to which it may be entitled.

C. Inspections or inspectors do not modify Contract Documents: Neither observations by an inspector retained by Owner, the presence or absence of such inspector on the site, nor inspections, tests, or approvals by others, shall relieve Contractor from any requirement of the Contract Documents, nor is any such inspector authorized to change any term or condition of the Contract Documents.

D. Contractor responsibilities on inspections: Contractor shall promptly furnish, without additional charge, all facilities, labor, material and equipment reasonably needed for performing such safe and convenient inspections and tests as may be required by Owner. Owner may charge Contractor any additional cost of inspection or testing when Work is not ready at the time specified by Contractor for inspection or testing, or when prior rejection makes reinspection or retest necessary. Owner shall perform its inspections and tests in a manner that will cause no undue delay in the Work.

5.16 CORRECTION OF NONCONFORMING WORK

A. Work covered by Contractor without inspection: If a portion of the Work is covered contrary to the request of Owner or the requirements in the Contract Documents or a governmental authority having jurisdiction, it must, if required in writing by Owner, be uncovered for Owner's observation and be replaced at Contractor's expense and without change in the Contract Sum or Contract Time.

B. Payment provisions for uncovering covered Work: If, at any time prior to Final Completion, Owner desires to examine the Work, or any portion of it, which has been covered, Owner may request to see such Work and it shall be uncovered by Contractor. If such Work is in accordance with the Contract Documents, the Contractor shall be entitled to an adjustment in the Contract Sum for the costs of uncovering and replacement, and, if completion of the Work is thereby delayed, an adjustment in the Contract Time, provided it makes such a request as provided in Part 7. If such Work is not in accordance with the Contract Documents, the Contractor shall pay the costs of examination and reconstruction.

C. Contractor to correct and pay for non-conforming Work: Contractor shall promptly correct Work found by Owner not to conform to the requirements of the Contract Documents, whether observed before or after Substantial Completion and whether or not fabricated, installed, or completed. Contractor shall bear all costs of correcting such nonconforming Work, including additional testing and inspections.

D. Contractor's compliance with correction and warranty provisions: If, within one year after the date of Substantial Completion of the Work or designated portion thereof, or within one year after the date for commencement of any system warranties established under Section 6.08, or within the terms of any applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, Contractor shall correct it promptly after receipt of written Notice from Owner to do so. Owner shall give such Notice promptly after discovery of the condition. This period of one year shall be extended, with respect to portions of Work first performed after Substantial Completion, by the period of time between Substantial Completion and the actual performance of the Work. Contractor's duty to correct with respect to Work repaired or replaced shall run for one year from the date of repair or replacement. Obligations under this Section 5.16D shall survive Final Acceptance and are in addition to other warranties provided by contract or law.

E. Contractor to remove non-conforming Work: Contractor shall remove from the Project site portions of the Work which are not in accordance with the requirements of the Contract Documents and are neither corrected by Contractor nor accepted by Owner.

F. Owner may charge Contractor for non-conforming Work: If Contractor fails to correct nonconforming Work within a reasonable time after written notice to do so, Owner may replace, correct, or remove the nonconforming Work and charge the cost thereof to the Contractor.

G. Contractor to pay for damaged Work during correction: Contractor shall bear the cost of correcting destroyed or damaged Work, whether completed or partially completed, caused by Contractor's correction or removal of Work which is not in accordance with the requirements of the Contract Documents.

H. No Period of limitation on other requirements: Nothing contained in this section shall be construed to establish a period of limitation with respect to other obligations which Contractor might have according to the Contract Documents. Establishment of the time period of one year as described in Section 5.16D relates only to the specific obligation of Contractor to correct the Work, and has no relationship to the time within which the Contractor's obligation to comply with the Contract Documents may be sought to be enforced, including the time within which such proceedings may be commenced.

I. Owner may accept non-conforming Work and charge Contractor: If Owner prefers to accept Work which is not in accordance with the requirements of the Contract Documents, Owner may do so instead of requiring its removal and correction, in which case the Contract Sum may be reduced as appropriate and equitable.

5.17 CLEAN UP

Contractor to keep site clean and leave it clean: Contractor shall at all times keep the Project site, including hauling routes, infrastructures, utilities, and storage areas, free from accumulations of waste materials. Before completing the Work, Contractor shall remove from the premises its rubbish, tools, scaffolding, equipment, and materials. Upon completing the Work, Contractor shall leave the Project site in a clean, neat, and orderly condition satisfactory to Owner. If Contractor fails to clean up as provided herein, and after reasonable notice from Owner, Owner may do so and the cost thereof shall be charged to Contractor.

5.18 ACCESS TO WORK

Owner and A/E access to Work site: Contractor shall provide Owner and A/E access to the Work in progress wherever located.

5.19 OTHER CONTRACTS

Owner may award other contracts; Contractor to cooperate: Owner may undertake or award other contracts for additional work at or near the Project site. Owner shall help coordinate the activities of Owner's own forces and of each separate contractor engaged by Owner with the Work of Contractor, who shall reasonably cooperate with the other contractors and with Owner's employees and shall carefully adapt scheduling and perform the Work in accordance with these Contract Documents to reasonably accommodate the other work.

5.20 SUBCONTRACTORS AND SUPPLIERS

A. Subcontractor Responsibility: The Contractor shall include the language of this paragraph in each of its first tier subcontracts, and shall require each of its subcontractors to include the same language of this section in each of their subcontracts, adjusting only as necessary the terms used for the contracting parties. Upon request of the Owner, the Contractor shall promptly provide documentation to the Owner demonstrating that the subcontractor meets the subcontractor responsibility criteria below. The requirements of this paragraph apply to all subcontractors

regardless of tier. At the time of subcontract execution, the Contractor shall verify that each of its first tier subcontractors meets the following bidder responsibility criteria:

1. Have a current certificate of registration as a contractor in compliance with chapter 18.27 RCW, which must have been in effect at the time of subcontract bid submittal;

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

3. If applicable, have:

   a. Industrial Insurance (workers' compensation) coverage for the subcontractor's employees working in Washington, as required in Title 51 RCW;

   b. A Washington Employment Security Department number, as required in Title 50 RCW;

   c. A Washington Department of Revenue state excise tax registration number, as required in Title 82 RCW;

   d. An electrical contractor license, if required by Chapter 19.28 RCW;

   e. An elevator contractor license, if required by Chapter 70.87 RCW.

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

5. On a project subject to the apprenticeship utilization requirements in RCW 39.04.320, not have been found out of compliance by the Washington state apprenticeship and training council for working apprentices out of ratio, without appropriate supervision, or outside their approved work processes as outlined in their standards of apprenticeship under chapter 49.04 RCW for the one-year period immediately preceding the date of the Owner's first advertisement of the project.

6. Meet all supplemental responsibility criteria set forth in the Contract Documents.

B. Provide names of Subcontractors and use qualified firms: Before submitting the first Application for Payment, Contractor shall furnish in writing to Owner the names, addresses, and telephone numbers of all Subcontractors, as well as suppliers providing materials in excess of $2,500. Contractor shall utilize Subcontractors and suppliers which are experienced and qualified, and meet the requirements of the Contract Documents, if any. Contractor shall not utilize any Subcontractor or supplier to whom Owner has a "reasonable objection," and shall obtain Owner's written consent before making any substitutions or additions. A "reasonable objection" shall include without limitation:

   .1 a proposed Subcontractor differing from the entity listed with a proposal or bid,

   .2 lack of "responsibility" of the proposed Subcontractor, as defined in RCW 39.04.350 or otherwise in the Contract Documents, or

   .3 lack of qualification, including technical qualification, as required by the Specifications.

C. Subcontracts in writing and pass through provision: All Subcontracts must be in writing. By appropriate written agreement, Contractor shall require each Subcontractor, so far as applicable to the Work to be performed by the Subcontractor, to be bound to Contractor by terms of the

Contract Documents, and to assume toward Contractor all the obligations and responsibilities which Contractor assumes toward Owner in accordance with the Contract Documents. Each Subcontract shall preserve and protect the rights of Owner in accordance with the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights. Where appropriate, Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. However, nothing in this paragraph shall be construed to alter the contractual relations between Contractor and its Subcontractors with respect to insurance or bonds.

D. Coordination of Subcontractors; Contractor responsible for Work: Contractor shall schedule, supervise, and coordinate the operations of all Subcontractors. No Subcontracting of any of the Work shall relieve Contractor from its responsibility for the performance of the Work in accordance with the Contract Documents or any other obligations of the Contract Documents.

E. Automatic assignment of subcontracts: Each subcontract agreement for a portion of the Work is hereby assigned by Contractor to Owner provided that:

1. Effective only after termination and Owner approval: The assignment is effective only after termination by Owner for cause pursuant to Section 9.01 and only for those Subcontracts which Owner accepts by notifying the Subcontractor in writing; and

2. Owner assumes Contractor's responsibilities: After the assignment is effective, Owner will assume all future duties and obligations toward the Subcontractor which Contractor assumed in the Subcontract.

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

5.21 WARRANTY OF CONSTRUCTION

A. Contractor warranty of Work: In addition to any special warranties provided elsewhere in the Contract Documents, Contractor warrants that all Work conforms to the requirements of the Contract Documents and is free of any defect in equipment, material, or design furnished, or workmanship performed by Contractor.

B. Contractor responsibilities: With respect to all warranties, express or implied, for Work performed or materials furnished according to the Contract Documents, Contractor shall:

1. Obtain warranties: Obtain, assign if requested, and furnish directly to Owner, all warranties that would be given in normal commercial practice or that are required by the Contract Documents, first executed by the applicable Subcontractor and those suppliers and manufacturers furnishing materials for the Work, and subsequently countersigned by Contractor, which shall extend to Owner all rights, claims, benefits and interests that Contractor may have under express or implied warranties or guarantees against the Subcontractor, supplier or manufacturer for defective or non-conforming Work;

2. Warranties for benefit of Owner: Require all warranties to be executed, in writing, for the benefit of Owner;

3. Enforcement of warranties: Enforce all warranties for the benefit of Owner, if directed by Owner; and

4. Contractor responsibility for subcontractor warranties: Be responsible to enforce any subcontractor's, manufacturer's, or supplier's warranties should they extend beyond the period specified in the Contract Documents.

C. Warranties beyond Final Acceptance: The obligations under this section shall survive Final Acceptance.

5.22 INDEMNIFICATION

A. Contractor to indemnify Owner: To the fullest extent permitted by law, Contractor shall defend, indemnify, and hold Owner and A/E, their consultants, and agents and employees, directors, officers, lenders, successors and assigns of any of them (collectively, the "Indemnified Parties"), harmless from and against all third-party claims, demands, losses, damages, or costs, including but not limited to damages arising out of bodily injury or death to persons and damage to property, direct and indirect, or consequential (including but not limited to costs and attorneys' fees incurred on such claims or in proving the right to indemnification), arising out of, caused by or resulting from:

1. Sole negligence of Contractor: The sole negligence or willful misconduct of Contractor or any of its Subcontractors, their agents and anyone directly or indirectly employed by them or anyone for whose acts they may be liable ("Indemnitor");

2. Concurrent negligence: The concurrent negligence of Indemnitor, but only to the extent of the negligence of Indemnitor; and

3. Patent infringement: The use of any design, process, or equipment that constitutes an infringement of any United States patent presently issued, or violates any other proprietary interest, including copyright, trademark, and trade secret, unless specifically directed to use such design, process, or equipment by Owner.

The obligations of Contractor under this Section 5.22 shall not be construed to negate, abridge, or otherwise reduce any other right or obligations of indemnity that would otherwise exist as to any party or person described in this Section. To the extent the wording of this Section 5.22 would reduce or eliminate the insurance coverage of Owner or Contractor, this Section 5.22 shall be considered modified to the extent that such insurance coverage is not affected. To the extent that any portion of this Section 5.22 is stricken by a court or arbitrator for any reason, all remaining provisions shall retain their vitality and effect. The provisions of this Section 5.22 shall survive completion, acceptance, final payment and termination of the Contract.

B. Employee action and RCW Title 51: In any action against Owner and any other entity indemnified in accordance with this section, by any employee of Contractor, its Subcontractors, Sub-subcontractors, agents, or anyone directly or indirectly employed by any of them, the indemnification obligation of this section shall not be limited by a limit on the amount or type of damages, compensation, or benefits payable by or for Contractor or any Subcontractor under RCW Title 51, the Industrial Insurance Act, or any other employee benefit acts. In addition, Contractor waives immunity as to Owner and A/E only, in accordance with RCW Title 51.

PART 6 - PAYMENTS AND COMPLETION

6.01 CONTRACT SUM

Owner shall pay Contract Sum: Owner shall pay Contractor the Contract Sum plus Washington State sales tax for performance of the Work, in accordance with the Contract Documents.

6.02 SCHEDULE OF VALUES

Contractor to submit Schedule of Values: Before submitting its first Application for Payment, Contractor shall submit to Owner for approval a breakdown allocating the total Contract Sum to each principal category of work, in such detail as requested by Owner ("Schedule of Values"). The approved Schedule of Values shall allocate at least the percentage of the original Contract Sum so designated in the Contract Documents to that portion of the Work between Substantial Completion and Final Completion to recognize not-yet-earned costs for demobilization, Project Record, O&M manuals, and any other requirements for Project closeout and in advancing the Work from Substantial Completion to Final Completion. The approved Schedule of Values shall be used by Owner as a basis for reviewing progress payments. Payment for Work shall be made only for and in accordance with those items included in the Schedule of Values.

6.03 APPLICATION FOR PAYMENT

A. Monthly Application for Payment with substantiation: At monthly intervals, unless determined otherwise by Owner, Contractor shall submit to Owner an itemized Application for Payment for Work (using Owner's form) completed in accordance with the Contract Documents and the approved Schedule of Values. Each application shall be supported by such substantiating data as Owner may require.

B. Contractor certifies Subcontractors paid: By submitting an Application for Payment, Contractor is certifying that all Subcontractors have been paid, less earned retainage in accordance with RCW 60.28.011, as their interests appeared in the last preceding Application for Payment. By submitting an Application for Payment, Contractor is recertifying that the representations set forth in Section 1.03 are true and correct, to the best of Contractor's knowledge, as of the date of the Application for Payment. Owner has the right to request written evidence from Contractor that Contractor has properly paid Subcontractors and material and equipment suppliers amounts paid by Owner to Contractor for subcontracted Work. Owner shall have the right to contact Subcontractors to ascertain whether they have been properly paid. Owner shall not have an obligation to pay or to see to the payment of money to a Subcontractor, except as may otherwise be required by law.

C. Reconciliation of Work with Progress Schedule: At the time it submits an Application for Payment, Contractor shall analyze and reconcile, to the satisfaction of Owner, the actual progress of the Work with the Progress Schedule. The submission of an Application for Payment constitutes a certification that the Work is current on the Progress Schedule.

D. Payment for material delivered to site or stored off-site: If authorized by Owner, the Application for Payment may include request for payment for material delivered to the Project site and suitably stored, or for completed preparatory work. Payment may similarly be requested for material stored off the Project site, provided Contractor complies with or furnishes satisfactory evidence of the following:

1. Suitable facility or location: The material will be placed in a facility or location that is structurally sound, dry, lighted and suitable for the materials to be stored or otherwise approved by Owner;

2. Facility or location within 10 miles of Project: The facility or location is located within a 10-mile radius of the Project. Other locations may be utilized, if approved in writing, by Owner;

3. Facility or location exclusive to Project's materials: Only materials for the Project are stored within the facility or location (or a secure portion of a facility or location set aside for the Project);

4. Insurance provided on materials in facility or location: Contractor furnishes Owner a certificate of insurance extending Contractor's insurance coverage for damage, fire, and theft to cover the full value of all materials stored, or in transit;

5. Facility or location locked and secure: The facility or location (or secure portion thereof) is continuously under lock and key, and only Contractor's authorized personnel shall have access;

6. Owner right of access to facility or location: Owner shall at all times have the right of access in company of Contractor;

7. Contractor assumes total responsibility for stored materials: Contractor and its surety assume total responsibility for the stored materials; and

8. Contractor provides documentation and Notice when materials moved to site: Contractor furnishes to Owner certified lists of materials stored, bills of lading, invoices, and other information as may be required, and shall also furnish Notice to Owner when materials are moved from storage to the Project site.

6.04 PROGRESS PAYMENTS

A. Owner to pay within 30 Days: Owner shall make progress payments, in such amounts as Owner determines are properly due, within 30 Days after receipt of a properly executed Application for Payment. Owner shall notify Contractor in accordance with chapter 39.76 RCW if the Application for Payment does not comply with the requirements of the Contract Documents.

B. Withholding retainage; Options for retainage: Owner shall retain 5% 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. Owner may permit Contractor to provide an appropriate bond in lieu of the retained funds.

C. Title passes to Owner upon payment: Title to all Work and materials covered by a progress payment shall pass to Owner at the time of such payment free and clear of all liens, claims, security interests, and encumbrances. Passage of title shall not, however, relieve Contractor from any of its duties and responsibilities for the Work or materials, or waive any rights of Owner to insist on full compliance by Contractor with the Contract Documents. A progress payment, or partial or entire use or occupancy of the Project by Owner, shall not constitute acceptance of Work.

D. Interest on unpaid balances: Payments due and unpaid in accordance with the Contract Documents shall bear interest as specified in chapter 39.76 RCW.

6.05 PAYMENTS WITHHELD

A. Owner's right to withhold payment: Owner may withhold or, on account of subsequently discovered evidence, nullify the whole or part of any payment to such extent as may be necessary to protect Owner from loss or damage for reasons including but not limited to:

1. Non-compliant Work: Work not in accordance with the Contract Documents;

2. Remaining Work to cost more than unpaid balance: Reasonable evidence that the Work required by the Contract Documents cannot be completed for the unpaid balance of the Contract Sum;

3. Owner correction or completion of Work: Work by Owner to correct defective Work or complete the Work in accordance with Section 5.16;

4. Third party claims for which Contractor may be responsible: Claims (except where an insurer has unconditionally accepted coverage without prior payment of any deductibles or self-insured retentions) filed or reasonable evidence indicating probable filing of such claims unless Contractor provides security acceptable to Owner;

5. Failure to pay Subcontractor: The failure of Contractor to make payments to Subcontractors for labor, materials or equipment;

6. Damages: Damage to Owner or a separate contractor (except where an insurer has unconditionally accepted coverage);

7. Affidavits of Wages Paid: Failure to submit affidavits pertaining to wages paid as requested or otherwise required by statute;

8. Progress Schedule: Failure to submit a properly updated Progress Schedule;

9. Maintenance of Project Record: Failure to properly maintain as the Project Record;

10. Other construction records: Failure to properly submit any other required construction reports or records;

11. Certified payrolls: Failure to properly submit certified payrolls when requested;

12. Contractor's failure to perform: Contractor's failure otherwise to perform in accordance with the Contract Documents; or

13. Contractor's negligent acts or omissions: Cost or liability that may occur to Owner as the result of Contractor's fault or negligent acts or omissions.

B. Owner to notify Contractor of withholding for unsatisfactory performance: In any case where part or all of a payment is going to be withheld for unsatisfactory performance, Owner shall notify Contractor in accordance with chapter 39.76 RCW.

6.06 RETAINAGE, BOND CLAIM RIGHTS, AND LIENS

A. Chapters 39.08 RCW and 60.28 RCW incorporated by reference: Chapters 39.08 RCW and 60.28 RCW, concerning the rights and responsibilities of Contractor and Owner with regard to the performance and payment bonds and retainage, are made a part of the Contract Documents by reference as though fully set forth herein.

B. Liens: Contractor shall promptly pay (and secure the discharge of any liens asserted by) all persons properly furnishing labor, equipment, materials or other items in connection with the performance of the Work (including, but not limited to, any Subcontractors) to the extent that Owner has paid Contractor for this Work. Owner may, at its option, withhold payment, in whole or in part, to Contractor until lien and claim releases are furnished. Contractor may provide other security acceptable to Owner, such as a bond, in lieu of paying disputed liens or claims. Contractor shall defend, indemnify, and hold harmless Owner from any liens, including all expenses and attorneys' fees, except to the extent a lien has been recorded because of a failure of payment by Owner for the Work implicated in any such lien.

6.07 SUBSTANTIAL COMPLETION

A. Substantial Completion defined: Substantial Completion is the stage in the progress of the Work (or portion thereof designated and approved by Owner) when the construction is sufficiently complete, in accordance with the Contract Documents, so Owner has full and unrestricted use and benefit of the facilities (or portion thereof designated and approved by Owner) for the use for which it is intended, the Project has been constructed in substantial accordance with the Contract Documents, and at a minimum the following elements have been accomplished (see also, Section 01 70 00 Project Completion):

1. A written punch list has been prepared;

2. The Authority Having Jurisdiction has granted a certificate of occupancy; and

3. The first final draft of the Operation and Maintenance manuals has been submitted to Owner.

All Work other than incidental corrective or punch list work shall be completed. Substantial Completion shall not have been achieved if the Work cannot achieve Final Completion within the time specified in the Agreement. The date Substantial Completion is achieved shall be established in writing by Owner. Contractor may request an early date of Substantial Completion which must be approved by Change Order. Owner's occupancy of the Work or designated portion thereof does not necessarily indicate that Substantial Completion has been achieved.

B. Contractor to provide weekly reports before Substantial Completion: Beginning at least 30 Days before the scheduled date of Substantial Completion, Contractor shall prepare reports weekly, identifying items to be completed in order to obtain necessary occupancy certificates and permits, and make recommendations to Owner for effectuating the earliest possible completion. When Contractor considers that the Work, or a portion thereof that Owner agrees to accept separately, has achieved Substantial Completion, Contractor shall prepare and submit to Owner a comprehensive list of items to be completed or corrected prior to final payment. Contractor shall proceed promptly to complete and correct items on the list. Failure to include an item on the list does not alter the responsibility of Contractor to complete all Work in accordance with the Contract Documents.

C. Owner to determine if Work is complete: Upon receipt of Contractor's list, Owner will make an inspection to determine whether the Work or designated portion thereof has achieved Substantial Completion. If Owner's inspection discloses any item, whether or not included on Contractor's list, that is not sufficiently complete in accordance with the Contract Documents so that Owner can occupy or utilize the Work or designated portion thereof for its intended use, Contractor shall, before the occurrence of Substantial Completion, complete or correct the item upon notification by Owner, and Contractor shall then submit a request for another inspection by Owner to determine Substantial Completion. If Owner determines that the Work or designated portion has not achieved Substantial Completion, Contractor shall expeditiously complete the Work or

designated portion, again request an inspection, and pay the costs associated with the re-inspection.

D. Owner may take over punch list: If, at 30 Days after the date of Substantial Completion, Owner considers that the remaining items on its list ("punch list") are unlikely to be completed within the time period specified in the Contract Documents for Final Completion, Owner may, upon seven Days' written Notice to Contractor, take over and perform some or all of the punch list items. If Contractor fails to correct the deficiencies within the time period specified, Owner may deduct the actual cost of performing this punch list work, including any design costs, plus ten 10% to account for Owner's transaction costs, from the Contract Sum.

E. Owner to establish date of Substantial Completion: When the Work or designated portion thereof has achieved Substantial Completion, Owner shall establish the date of Substantial Completion in writing, establish responsibilities of Contractor for security, maintenance, heat, utilities, damage to the Work and insurance, and fix the time within which Contractor shall finish all items on the list accompanying the document. The writing establishing Substantial Completion shall be submitted to Contractor for its written acceptance of the responsibilities assigned to it. Any items not included in the document but required or necessary for Final Completion of the Work shall be supplied and installed by Contractor as a part of the Contract Sum, notwithstanding their not being included in the punch list. Upon written acceptance of the writing establishing Substantial Completion by Contractor and Owner, and upon Contractor's Application for Payment, Owner shall make payment as provided in the Contract Documents. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents. No further payment will be due or owing until the payment following Final Completion.

F. Contractor to complete punch list in timely manner: Contractor shall prepare, continue to monitor, and cause to be completed, all punch lists with respect to the activity of each Subcontractor and report weekly to Owner on outstanding punch list items.

6.08 PRIOR OCCUPANCY

A. Prior Occupancy defined; Restrictions: Owner may, when legally permissible to do so and upon written Notice to Contractor, take possession of or use any completed or partially completed portion of the Work ("Prior Occupancy") at any time prior to Substantial Completion, and Contractor shall cooperate with such occupancy and use and the establishment of a punch list. Unless otherwise agreed in writing, Prior Occupancy shall not: be deemed an acceptance of any portion of the Work; accelerate the time for any payment to Contractor; prejudice any rights of Owner provided by any insurance, bond, guaranty, or the Contract Documents; relieve Contractor of the risk of loss or any of the obligations established by the Contract Documents; establish a date of Substantial or Final Completion; establish a date for termination or partial termination of the assessment of liquidated damages; or constitute a waiver of claims.

B. Damage; Duty to repair and warranties: Notwithstanding anything in the preceding paragraph, Owner shall be responsible for loss of or damage to the Work resulting from Prior Occupancy. Contractor's one year duty to repair any system warranties shall begin on building systems activated and used by Owner as agreed in writing by Owner and Contractor.

6.09 FINAL COMPLETION, ACCEPTANCE, AND PAYMENT

A. Final Completion defined: Final Completion shall be achieved when the Work is fully and finally complete in accordance with the Contract Documents. The date Final Completion is achieved shall be established by Owner in writing, but in no case shall it constitute Final Acceptance, which is a subsequent, separate, and distinct action (see also, Section 01 70 00 Project Completion).

B. Final Acceptance defined: Unless otherwise determined by Owner, Final Acceptance shall be achieved after Contractor has completed all the requirements of the Contract Documents. The date Final Acceptance is achieved shall be established by Owner in writing. Pursuant to RCW 60.28, "Lien for Labor, Materials, Taxes on Public Works," completion of the Contract Work shall occur upon Final Acceptance. Neither Final Acceptance nor final payment shall release Contractor or its sureties from any obligations of these Contract Documents or the payment and performance bonds, or constitute a waiver of any claims by Owner arising from Contractor's failure to perform the Work in accordance with the Contract Documents (see also, Section 01 70 00 Project Completion).

C. Final payment waives Claim rights: Acceptance of final payment by Contractor or any Subcontractor shall constitute a waiver and release to Owner of all claims by Contractor or any such Subcontractor for an increase in the Contract Sum or the Contract Time, and for every act or omission of Owner relating to or arising out of the Work, except for those Claims made in accordance with the procedures, including the time limits, set forth in Part 8.

PART 7 - CHANGES

7.01 CHANGE IN THE WORK

A. Changes in the Work: Changes in the Work may be accomplished after execution of the Contract without invalidating the Contract. Changes in the Work that adjust the Contract Sum and/or Contract Time are incorporated into the Contract solely by Change Order and are subject to the limitations stated in this Part 7 and elsewhere in the Contract Documents. A Change Order may be bilateral or unilateral, as described below. Change Orders may be initiated by mutual agreement or through a Contract Change Proposal ("CCP") or Work Directive ("WD").

B. Change Orders:

1. A Bilateral Change Order is signed by Owner and Contractor to record their agreement on the terms of a change in the Work. A Bilateral Change Order may reflect the agreement of Owner and Contractor on a standalone issue, or it may incorporate one or more mutually agreed upon CCPs or WDs. A Bilateral Change Order shall constitute full payment and final settlement of all claims for time and cost, including direct, indirect, impact and consequential costs, related to the Change Order and Work covered by, affected by and related to the events giving rise to the Change Order.

2. A Unilateral Change Order is initially signed only by Owner to set forth, subject to the Contract, the terms of a change in the Work based upon one or more CCPs and/or WDs to which the parties have not yet fully agreed. Within 7 Days of its receipt of a Unilateral Change Order, Contractor shall notify Owner in writing either (a) of its acceptance of its terms, in which case the Unilateral Change Order will automatically become a Bilateral Change Order, or (b) of Contractor's rejection, in which case Contractor must submit a written rejection within 14 Days after Contractor delivered written Notice of rejection to Owner as noted above. The written rejection must fully explain the reasons for rejecting the Unilateral Change Order and include all necessary supporting documentation. The rejection will then be considered in accordance with Section 8.02 (Informal Resolution of Disputes). Failure to submit a written Notice of rejection within 7 Days of Contractor's receipt of a Unilateral Change Order or a written rejection with 14 Days shall constitute Contractor's acceptance of the terms of the Unilateral Change Order.

C. Change Orders via Contract Change Proposal:

1. Contractor shall be responsible for maintaining an Issues Log. If Contractor at any time believes that a change in the Work has or may have occurred, Contractor shall add such item to the Issues Log. At a minimum, the Issues Log shall identify:

   a. Detailed scope of the change in the Work;

   b. Contract Time impact noting specifically how it impacted the critical path of the project, if any;

   c. The amount of any anticipated, proposed, or approved change in the Contract Sum;

   d. Date first included on the Issues Log;

   e. Owner-initiated or Contractor-initiated; and

   f. Action status.

2. If the Contractor believes an item on the Issues Log warrants a CCP, Contractor shall provide written Notice to Owner in accordance with Section 8.02, and shall submit a written CCP in accordance with this Section. All CCPs shall be substantiated and submitted within 7 Days of being added to the Issues Log along with a revised progress schedule identifying the time impact affecting the critical path, if any. The CCP shall identify the proposed full compensation for implementing the proposed change in the Work, including any adjustment in the Contract Sum or Contract Time. Upon receipt of the CCP, Owner may accept the proposal and incorporate it into a Bilateral Change Order, reject the proposal and either issue a WD or elect not to proceed with the proposal, request further documentation, or negotiate acceptable terms with Contractor.

D. Work Directives:

1. A WD is a written order prepared by Owner that directs Contractor to perform Work prior to total agreement on an adjustment, if any, in the Contract Sum and/or Contract Time. Owner may direct Contractor, at any time and without invalidating the Contract, through a WD to proceed with a change in the Work or to perform Work that Contractor contends to be a change in the Work, with or without the agreement of Contractor and prior to agreement of the basis for adjustment, if any, to the Contract. Owner's use of a WD does not constitute agreement that the directive constitutes a change in the Work, the Contract Sum or the Contract Time.

2. A WD normally includes:

   a. The scope of the directed Work,

   b. Any proposed adjustment to the Contract Sum or not-to-exceed amount,

   c. Any proposed change to the Contract Time,

   d. The proposed method of determining any change in the Contract Sum and/or Contract Time, and

e. The supporting data that Contractor must submit in accordance with the requirements of Part 7 of the General Conditions.

3. Upon receipt of a WD, Contractor shall promptly commence and proceed diligently with performance of the directed Work. Within 7 Days of its receipt of a WD, Contractor shall notify Owner in writing either (a) of its acceptance of its terms, in which case the terms will become effective, and the WD will be incorporated into a Bilateral Change Order, or (b) of Contractor's rejection of the terms, in which case Contractor must submit a written rejection within 14 Days after Contractor delivered written Notice to Owner as noted above. The written rejection must fully explain the reasons for rejecting the WD and include all necessary supporting documentation. The rejection will then be considered in accordance with Section 8.02. Contractor's rejection of a WD shall not relieve Contractor of its obligation to comply promptly with the WD.

E. Contractor fault or negligence alleged as basis for change in Contract Sum: No change in the Contract Sum shall be allowed to the extent Contractor's changed cost of performance is due to the fault or negligence of Contractor or anyone for whose acts Contractor is responsible; or to the extent Contractor is responsible for change concurrently caused by Contractor and Owner; or to the extent the change is caused by an act of Force Majeure as defined in Section 3.05.

7.02 CHANGE IN THE CONTRACT SUM

A. General Application

1. Contract Sum changes only by Change Order: The Contract Sum shall only be changed by a Change Order.

2. Allowances: Any Allowances stated in the Contract Documents shall be included in the Contract Sum. Items covered by Allowances shall be supplied for such amounts and by such persons or entities as Owner may direct, but Contractor shall not be required to employ persons or entities to whom Contractor has made reasonable and timely objection. Owner shall select materials and equipment under an Allowance with reasonable promptness. Allowances shall cover the net cost to Contractor of materials and equipment delivered and/or installed at the site, as identified in the Allowance, and all required taxes, less applicable trade discounts. Whenever actual 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 the difference between actual, reasonable costs and the Allowances.

3. Pricing Components: Contractor shall maintain and submit a complete itemization of the costs incurred as a result of any change in the Work, including labor, material, Subcontractor costs, and fee. The total cost of any change in the Work or of any other increase or decrease in the Contract Sum, including a Claim, shall be limited to the actual, reasonable amounts for the following components, itemized in the manner set forth below and submitted on breakdown sheets in a form approved by Owner. If the total cost of the change in the Work does not exceed $5,000.00, Contractor shall not be required to submit a breakdown if the description of the change in the Work is sufficiently definitive for Owner to determine fair value.

   a. Labor costs: The labor cost component is determined by multiplying the estimated or actual additional number of hours needed to perform the change in the Work by the fully burdened hourly labor costs. The fully burdened hourly costs shall include the following:

(1) Basic wages and benefits: Hourly rates and benefits as stated on the Department of Labor and Industries approved "Statement of Intent to Pay Prevailing Wages" shall be applicable unless a high, documented amount is actually paid by a contractor for the laborers, apprentices, journeymen, foremen, and other staff performing and/or directly supervising the change in the Work at the site. Any amount in excess of approved "Statement of Intent to Pay Prevailing Wages" shall be substantiated and subject to audit.

(2) Worker's insurance: Direct contributions to the State of Washington for industrial insurance; medical aid; and supplemental pension, by the class and rates established by the Department of Labor and Industries.

(3) Federal insurance: Direct contributions required by the Federal Insurance Compensation Act; Federal Unemployment Tax Act; and the State Unemployment Compensation Act.

(4) Supervision: The labor cost component may include the actual, demonstrated additional supervision hours (not already compensated by Owner) directly related to a change in the Work.

(5) Travel and Per Diem allowance: Travel allowance and/or subsistence, if applicable, required by regional labor union agreements, which are itemized and identified separately.

b. Material costs: The material cost component must be itemized and include material invoices or reasonable lump-sum estimates of the quantity and cost of additional materials needed to perform the change in the Work. Material costs shall be developed first from actual known costs; second from supplier quotations; and, if neither of these is available, then from standard industry pricing guides acceptable to Owner. Material costs shall consider all available discounts. Freight costs, express charges, or special delivery charges shall be itemized.

c. Equipment costs: The equipment cost component must be itemized by the type of equipment and include the estimated or actual length of time the construction equipment appropriate for the Work is or will be used on the change in the Work on site. Costs will be allowed for construction equipment only to the extent used solely for the changed Work, or for additional rental costs actually incurred by Contractor solely for the changed Work. Equipment charges shall be computed on the basis of actual invoice costs or, if owned, from the current edition of the Associated General Contractors Washington State Department of Transportation (AGC WSDOT) Equipment Rental Agreement current edition as of the Contract execution date. The EquipmentWatch Rental Rate Blue Book shall be used as a basis for establishing rental rates of equipment not listed in the above source. The maximum rate for standby equipment shall not exceed that shown in the AGC WSDOT Equipment Rental Agreement. The rate for Contractor-owned equipment necessarily standing by for future use on the changed Work shall be no more than 50% of the rate established above unless otherwise approved by Owner. The total rental cost shall not exceed the cost of purchasing the equipment outright.

d. Subcontractor costs: The Subcontractor cost component consists of payments Contractor makes to Subcontractors for the cost of changed Work performed by

Subcontractors. Subcontractors' costs shall be calculated and itemized in the same manner as prescribed herein for Contractor.

e. Fee: The Fee component is compensation for all items and costs not listed in subparagraphs a through d above, and is added to the total cost to Owner of the sum of these items. The Fee shall compensate Contractor, Subcontractor and suppliers for, among other things, combined overhead, profit and other costs, including all office, home office and site overhead, employee per diem, subsistence and travel costs not separately reimbursable under subparagraph a above, warranty, safety costs, printing and copying, quality control/assurance, purchasing, small or hand tool (a tool that costs $250 or less and is normally furnished by the performing contractor) or expendable charges, temporary construction facilities, field engineering, schedule updating, Project Record, home office cost, taxes (including all taxes except B&O tax and Washington State sales tax payable based on the amount of the approved Application for Payment), office engineering, estimating costs, additional overhead because of extended time, Claim and change preparation, direct and indirect delay, acceleration or impact, and any other cost incidental to the change in the Work. The Fee shall be strictly limited in all cases to the rates below.

(1). Contractor markup on Contractor Work: Contractor is allowed a Fee for any Work actually performed by Contractor's own forces of 16% of the first $50,000 of the cost of such Work and 4% of the remaining cost, if any.

(2). Subcontractor markup for Subcontractor Work: Each Subcontractor (including lower-tier Subcontractors) is allowed a Fee for any Work actually performed by its own forces of 16% of the first $50,000 of the cost of such Work and 4% of the remaining cost, if any.

(3). Contractor markup for Subcontractor Work: Contractor is allowed a Fee for any Work performed by its Subcontractor(s) of 6% of the first $50,000 of the amount due each Subcontractor for such Work and 4% of the remaining amount, if any.

(4). Subcontractor markup for lower-tier Subcontractor Work: Each Subcontractor is allowed a Fee for any Work performed by its Subcontractor(s) of any lower-tier of 4% of the first $50,000 of the amount due the lower-tier Subcontractor for such Work and 2% of the remaining amount, if any.

(5). Basis of cost applicable for markup: The cost of the Work to which the Fee is to be applied shall be based on the cost components in subparagraphs 7.02.A 3.a – d.

(6). Application of Fee: The Fee shall not be included on deductive changes in the Work. Where a change in the Work involves additive and deductive work by Contractor or the same Subcontractor, the Fee as well as bond and insurance markups will apply to the net difference.

f. Insurance and bond premiums: The cost of any change in insurance or bond premium is added to the sum of the cost components in subparagraphs 7.02.A 3.a – e and is limited to the following:

(1) Contractor's liability insurance: The cost of any changes in Contractor's contractually required liability insurance arising directly from the Change Order; and

(2) Payment and Performance Bond: The cost of any additional premium for Contractor's contractually required bond arising directly from the Change Order.

g Tax: Washington State sales tax and B&O tax arising directly from the Change Order shall be added to the cost of the Change Order.

h. Unit Prices: If Unit Prices, including pre-agreed rates for material quantities, are applicable to a change in the Work, the Unit Prices shall be applied to the quantities of the items involved as determined in Section 7.02A. Quantities must be supported by field measurement statements signed by Owner. Owner shall be afforded access and be permitted to measure quantities. Contractor shall not exceed any cost limit(s) without Owner's prior written approval. Unit Prices shall include reimbursement for all direct and indirect costs of the Work, but exclude Fee (7.02 A.e), bond, and insurance costs (7.02 A.f.).s.

7.03 CHANGE IN THE CONTRACT TIME

A. Changes in Contract Time: The Contract Time shall only be changed by a Change Order.

B. Time extension permitted only if delay is not Contractor's fault: If Contractor is delayed at any time in the commencement or progress of the Work (1) by an act or neglect of Owner or anyone for whose acts Owner is responsible; or (2) by changes ordered by Owner in the Work; or (3) by Force Majeure; or (4) by delay authorized by Owner pending dispute resolution; or (5) by other causes that Owner determines may justify delay, then Contractor shall reasonably attempt to mitigate the delay, and the Contract Time shall be extended by Change Order for such reasonable time as Owner may reasonably determine consistent with the provisions of the Contract Documents. No adjustment in the Contract Time shall be allowed to the extent Contractor's changed time of performance is due to the fault or negligence of Contractor or anyone for whose acts Contractor is responsible.

C. Contractor must demonstrate impact on critical path of schedule: Any change in the Contract Time covered by a Change Order or Claim shall be limited to the change in the critical path of the Work attributable to the change or event(s) giving rise to the Change Order or Claim. Contractor shall be responsible for showing clearly on the Progress Schedule that the change or event had a specific impact on the critical path and, except in case of concurrent delay, was the sole cause of such impact, and could not have been avoided by resequencing of the Work or other reasonable alternatives in accordance with Section 01 32 13 Project Schedule.

D. Cost arising from change in Contract Time: Contractor is entitled to compensation for the cost of a change in Contract Time only if all the following conditions are met:

1. Must be solely fault of Owner: The change in Contract Time must solely be caused by the fault or negligence of Owner or others for whom Owner is responsible;

2. Procedures: Contractor must follow the procedure set forth in Section 7.03B and Section 8.02;

3. Demonstrate impact on critical path: Contractor must establish the extent of the change in Contract Time in accordance with Section 7.03C and Section 01 32 13 Project

Schedule. Owner is not obligated directly or indirectly for damages or an increase in the Contract Sum for any delay suffered by a Subcontractor that does not increase the Contract Time; and

4. Cost measured exclusively by the pricing components of Section 7.02A.3: If Contractor or a Subcontractor of any tier is entitled to compensation arising from or related to a change in Contract Time, the pricing components of Section 7.02A.3 shall exclusively be used to measure the actual costs incurred as a result of the change in Contract Time. Neither Contractor nor a Subcontractor of any tier is entitled to payment for costs arising out of actual or alleged loss of efficiency; morale, fatigue, attitude, or labor rhythm; home office overhead; expectant underrun; trade stacking; reassignment of workers; rescheduling of work; concurrent operations; dilution of supervision; learning curve; beneficial or joint occupancy; logistics; ripple; season change; extended overhead; profit upon damages for delay; impact damages, including cumulative impact; or similar damages.

PART 8 - CLAIMS AND DISPUTE RESOLUTION

8.01 CLAIMS

A. Definition: A Claim is a demand or assertion by one of the parties seeking, as a matter of right, adjustment or interpretation of the Contract terms, payment of money, extension of time or other relief with respect to the terms of the Contract Documents. The term "Claim" also includes other disputes and matters in question between Owner and Contractor arising out of or relating to the Contract Documents. Claims must be initiated in writing and be made in accordance with the Contract Documents. Neither a CCP, a Request for Information, a Bilateral or Unilateral Change Order, a reservation of rights, minutes of a meeting, a daily report, or a log entry shall constitute a Claim or Notice of a Claim. However, Owner and Contractor may agree in a signed writing to supplement how Contractor can provide a Notice of Claim as specified in this Part 8.

B. Continuing Contract performance: Pending final resolution of a Claim, including the dispute resolution process in Part 8, and except as otherwise agreed in writing or in the Contract Documents, Contractor shall proceed diligently with performance of the Work and maintain the Progress Schedule, and Owner shall continue to make payments of undisputed amounts in accordance with the Contract Documents.

C. Claims for additional cost: If Contractor wishes to make a Claim for an increase in the Contract Sum, written Notice as provided herein shall be given before proceeding to execute the Work, and written Notice and a written Claim must be made in accordance with this Part 8, or it will be waived.

D. Claims for additional time: If Contractor wishes to make a Claim for an increase in the Contract Time, written Notice as provided herein shall be given, and a written Claim must be made in accordance with this Part 8, or it will be waived.

E. Claims for consequential damages: Contractor and Owner waive certain Claims against each other for consequential damages arising out of or relating to this Contract. This mutual waiver includes damages incurred by Owner for profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and damages incurred by Contractor for principal and home office overhead and expenses including but not limited to the compensation of personnel stationed there, for loss of financing, business and/or reputation, for losses on other projects, for loss of profit, and for interest or financing costs. This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination. Nothing contained in this subparagraph E, however, shall be deemed to preclude an

award of liquidated or other delay damages, when applicable, in accordance with the Contract Documents, or to preclude or limit Contractor's obligation to procure and maintain the insurance policies required by this Contract or indemnify Owner for damages, including direct, indirect or consequential damages, alleged by a third party.

8.02 INFORMAL RESOLUTION OF DISPUTES

A. Procedure to reduce disputes: In an effort to reduce the incidence and cost to all parties of extended disputes, all disputes, direct or indirect, arising out of or relating to the Contract Documents or the breach thereof, except those that have been waived under the terms of the Contract Documents, shall be decided exclusively by the dispute resolution procedure of Part 8 unless the parties mutually agree in writing otherwise. To the extent that Owner and Contractor agree to a partnering or dispute review process to help address disputes, these processes shall be in addition to, and not in place of, the mandatory contractual dispute resolution procedures.

B. Notice: Except for disputes requiring Notice before proceeding with the affected Work as otherwise described in the Contract Documents, Contractor shall submit a written Notice of any Claim to Owner's Project Manager, consistent with the requirements of the Contract Documents, within 7 Days of the occurrence of the event giving rise to a dispute. If Contractor did not have actual knowledge of such an event, the written Notice shall be submitted within 7 Days of the date that Contractor reasonably should have been aware of the event. The Notice shall set forth, at a minimum, a description of the event(s) leading to or causing the dispute, the nature of the impacts to Contractor and its Subcontractors, if any, and an estimate of any claimed adjustments in the Contract Sum and/or Contract Time. Without waiving any rights, Owner and Contractor may discuss and attempt to resolve a dispute identified in a Notice of Claim directly with each other or with a third-party neutral or dispute review board if utilized on a Project.

C. Substantiation: If an issue remains unresolved, Contractor shall submit timely written substantiation to support Contractor's position relating to the Notice of Claim. Such substantiation, which shall include an explanation of Contractor's position and any supporting documentation, shall be provided within 30 Days of submitting a Notice. Contractor may delay submitting data by an additional 14 Days if it notifies Owner that substantial data must be assembled.

D. Owner's Project Manager to make initial decision on all disputes: After Contractor has submitted written substantiation to Owner that complies with all applicable provisions of Parts 7 and 8, as well as Section 01 32 13, Project Schedule, Owner's Project Manager will endeavor to respond, in writing, to Contractor within 7 Days of the date substantiation is received, or with Notice to Contractor of the date by which Owner's Project Manager expects to render a decision. If necessary to fully and fairly evaluate an issue, the Project Manager may request additional information or extend the time in which to respond. If the issue is not resolved, or if Project Manager does not respond within the later of 7 Days of the date written substantiation is received or the date specified for rendering a decision, the dispute may be escalated by Contractor to Owner's Assistant Vice President, Facilities Services, Capital as set forth in Section 8.02E below.

E. Contractor may respond to initial decision: The initial decision of the Project Manager will be final and conclusive unless, within 7 Days of the date Contractor receives the initial decision or the date specified for rendering a decision, Contractor notifies Owner's Project Manager in writing of Contractor's disagreement with the initial decision, in which case Contractor must then submit a written rejection to Owner's Assistant Vice President, Facilities Services, Capital within 14 Days. The written rejection must attach the submitted Notice and substantiation and fully explain the reasons for Contractor's disagreement with the initial decision. It must also include all applicable supporting documentation. Failure to submit a written rejection to Owner's Assistant Vice

President, Facilities Services, Capital within 14 Days shall constitute Contractor's acceptance of the initial decision.

F. Assistant Vice President, Facilities Services, Capital decision: Following Contractor's full compliance with the procedure above, Owner's Assistant Vice President, Facilities Services, Capital will endeavor to respond in writing to Contractor with a decision within 7 Days of delivery of the Contractor's rejection or with Notice to Contractor of the date by which Owner's Assistant Vice President, Facilities Services, Capital expects to render a decision. If Owner's Assistant Vice President, Facilities Services, Capital does not respond within the later of 7 Days after delivery of the rejection or the date specified to render a decision, the dispute will be deemed denied and Contractor may further escalate the dispute as set forth in Section 8.02G below.

G. Claim: If Contractor disagrees with the decision of the Assistant Vice President, Facilities Services, Capital, or if no decision is timely received, Contractor shall timely submit a Claim if it wishes to pursue formal dispute resolution or seek additional relief against Owner of any kind. A Claim must be consistent with the Notice, substantiation and rejection previously provided, be submitted to Owner in writing within 14 Days of the date the decision of the Assistant Vice President, Facilities Services, Capital is received by Contractor or due, and comply with Section 8.04. Any claim of a Subcontractor of any tier may be brought only through, and after review by, Contractor. Contractor acknowledges and agrees that no additional documentation from what was submitted to Owner's Assistant Vice President, Facilities Services, Capital (per part 'F' of this section) may be submitted and considered in any subsequent dispute resolution proceeding. Contractor's failure to provide timely information for Owner's consideration during the dispute resolution procedure of Part 8 has a substantial impact upon and prejudices Owner, including but not limited to its inability to fully investigate or verify a Claim, mitigate damages, choose alternative options, adjust the budget, delete or modify the impacted Work, and/or monitor time, cost and quantities.

8.03 FORMAL RESOLUTION OF CLAIMS

A. Option for direct discussions: At any time following Contractor's initiation of formal dispute resolution, Owner may require that an officer of Contractor and Owner's Assistant Vice President, Facilities Services, Capital (all with authority to settle) meet, confer, and attempt to resolve the Claim. If the Claim is not resolved during such meeting, or if no such meeting is requested, Contractor may bring no litigation against Owner unless Contractor complies with the procedures described in Sections 8.03B and C. This requirement cannot be waived except by an explicit written waiver signed by Owner and Contractor.

B. Mediation:

1. Mediation required: Claims, disputes, or other matters in controversy arising out of or related to the Contract shall be subject to mediation as a condition precedent to the initiation of binding dispute resolution. This requirement cannot be waived except by an explicit written waiver signed by both Owner and Contractor. Unless Owner and Contractor mutually agree in writing otherwise, all unresolved Claims shall be considered at a single mediation session that shall occur after Substantial Completion and prior to Final Acceptance by Owner.

2. Mediation procedure: The parties shall endeavor to resolve Claims by mediation. A request for mediation shall be delivered in writing to the other party to the Contract, and the parties shall promptly attempt to mutually agree on a mediator. If the parties do not agree on a mediator within 30 Days of a party's demand, the mediation, 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. Mediation shall proceed in advance of binding dispute resolution proceedings.

3. Mediation fee to be shared: The parties to the mediation 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.

4. Representatives with authority must attend mediation: Representatives of Contractor and Owner must attend the mediation session in person with authority to settle the Claim. To the extent there are other parties in interest, such as A/E, insurers or Subcontractors, their representatives, also with authority to settle the Claim, shall also attend the mediation session in person.

C. Litigation: Contractor may bring no litigation on a Claim unless the Claim has been raised and considered in accordance with the procedures of this Part 8, including mandatory mediation. Contractor shall have the burden to demonstrate in any litigation that it has complied with all requirements of this Part 8. All unresolved Claims of Contractor shall be waived and released unless Contractor has complied with the time limits of the Contract Documents, and litigation is served and filed within 180 Days after the Date of Substantial Completion approved in writing by Owner. This requirement cannot be waived except by an explicit, written waiver signed by Owner and Contractor. The pendency of a mediation, which shall mean the time period between a party's receipt of a written mediation demand and the date of the initial mediation session, shall stay this deadline for serving and filing a lawsuit. The deadline may also be stayed for an additional period by agreement of the parties or court order. Neither Contractor nor a Subcontractor, whether claiming under a bond or lien statute or otherwise, shall be entitled to attorneys' fees directly or indirectly from Owner (but may recover attorneys' fees from the bond or statutory retainage fund itself to the extent allowable under law).

8.04 CLAIMS PROCESS

A. Notice and Claims: Any Notice and any Claim of Contractor, whether under the Contract or otherwise, must be made pursuant to and in strict accordance with the applicable provisions of the Contract Documents. No act, omission, or knowledge, actual or constructive, of Owner or anyone for whose acts Owner is responsible shall in any way be deemed to be a waiver of the requirement for timely written Notice and a timely written Claim unless Owner and Contractor sign an explicit, unequivocal written waiver. The fact that Owner and Contractor may consider, discuss, or negotiate a Claim that has or may have been procedurally or substantively defective or untimely under the Contract shall not constitute a waiver of the provisions of the Contract Documents unless Owner and Contractor sign an explicit, unequivocal written waiver. Contractor acknowledges and agrees that Contractor's failure to timely submit required Notices and/or timely submit Claims has a substantial impact upon and prejudices Owner, including but not limited to its inability to fully investigate or verify the Claim, mitigate damages, choose alternative options, adjust the budget, delete or modify the impacted Work, and/or monitor time, cost and quantities.

B. 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. Any requests by Contractor for an adjustment in both the Contract Sum and Contract Time that arise out of the same event(s) shall be submitted together. A Claim must be fully substantiated and documented. At a minimum, a Claim shall contain the following information:

1. 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, that confirms not only that Contractor suffered the damages claimed, but that the damages claimed were actually a result of the act, event, or condition complained of;

2. Dates: The date on which event(s) arose which gave rise to the Claim;

3. Owner and A/E employee's knowledgeable about Claim: The name of each employee of Owner and/or A/E believed to be knowledgeable about the Claim;

4. Support from Contract Documents: The specific provisions of the Contract Documents that support the Claim;

5. Identification of other supporting information: The identification of any documents and the substance of any oral communications that support the Claim;

6. Copies of supporting documentation: Data and copies of any identified documents, other than the Contract Documents, that support the Claim, including without limitation a complete explanation as to why the relief sought is not within the scope of the Contract Documents;

7. Details on Claim for Contract Time: If an adjustment in the Contract Time is sought, the specific days and dates for which it is sought; the specific reasons Contractor believes an extension in the Contract Time should be granted, and Contractor's analysis of its Progress Schedule to demonstrate the reason for the extension in Contract Time showing cause and analysis of the resultant delay to the critical path and other information required by the Contract Documents and Section 01 32 13, Project Schedule;

8. Details on Claim for adjustment of Contract Sum: If an adjustment in the Contract Sum is sought, the exact amount sought and a breakdown of that amount into the categories and with the detail required by Section 7.02; and

9. 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 Contract Sum or Contract Time for which Contractor believes Owner is responsible.

C. False Claims: Contractor shall not make any negligent or fraudulent misrepresentations, concealments, errors, omissions, or inducements to Owner in the formation or performance of this Contract. If Contractor or a Subcontractor submits false or frivolous substantiation or a Claim to Owner, which for purposes of this Section 8.01C is defined as substantiation or a Claim based in whole or in part upon a materially incorrect fact, statement, representation, assertion, or record, Owner shall be entitled to collect from Contractor by offset or otherwise (without prejudice to any right or remedy of Owner) any and all costs and expenses, including investigation and consultant costs, incurred by Owner in investigating, responding to, and defending against such false or frivolous substantiation or Claim.

D. Notification of surety: Owner may, but is not obligated to, notify Contractor's surety, if any, of the nature and amount of any claim it may assert against Contractor. If the claim relates to a possibility of Contractor's default, Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

E. Liens: If a Claim relates to or is the subject of a lien, the party asserting such Claim may proceed in accordance with applicable law to comply with the lien notice and filing deadlines.

F. All Claims must be submitted for final resolution within the time period specified by applicable law: Owner and Contractor shall commence all Claims and causes of action, whether in contract, tort, breach of warranty or otherwise, against the other arising out of or related to the Contract in accordance with the requirements of this Part 8 and within the time period specified by applicable law.

G. Waiver of rights: Any Claim of Contractor against Owner shall be conclusively deemed to have been waived by Contractor unless made in accordance with the requirements of Part 8.

H. Owner may investigate: To assist in the review of a Claim, Owner may at any time visit the Project site, communicate directly with Subcontractors, or request additional information (including requesting an audit as authorized below) in order to fully evaluate the issues raised by the Claim.

I. Owner may audit Claims: All Claims filed against Owner shall be subject to audit at any time following the filing of the Claim. Failure of Contractor or Subcontractors of any tier to permit Owner access to the books and records of Contractor or Subcontractors of any tier, or to maintain and retain sufficient records to allow Owner to verify all or a portion of the Claim, shall constitute a waiver of the Claim and shall bar any recovery.

J. Contractor to make documents promptly available: In support of Owner's audit of any Claim, Contractor and any Subcontractor shall, upon request, promptly make available to Owner within seven Days of Owner's request, at the office of Contractor or any requested Subcontractor during normal business hours, at least the following documents and other documents requested by Owner; failure to fully comply with this requirement shall constitute a material breach of contract and waiver of any Claim:

1. Daily time sheets and supervisor's daily reports;
2. Collective bargaining agreements;
3. Insurance, welfare, and benefits records;
4. Payroll registers;
5. Earnings records;
6. Payroll tax forms;
7. Material invoices, requisitions, and delivery confirmations;
8. Material cost distribution worksheet;
9. Equipment records (list of company equipment, rates, etc.);
10. Vendors', rental agencies', Subcontractors', and agents' invoices;
11. Contracts between Contractor and each of its Subcontractors, and all lower-tier Subcontractor contracts and supplier contracts;
12. Subcontractors' and agents' payment certificates;

13. Cancelled checks (payroll and vendors);

14. Job cost reports, including job cost summary and job cost detail reports, related labor and equipment reports, and monthly totals;

15. Job payroll ledger;

16. Planned resource loading schedules and summaries;

17. General ledger;

18. Cash disbursements journal;

19. Financial statements for all years during performance of the Work. In addition, Owner may require, if it deems it appropriate, additional financial statements for 3 years preceding execution of the Work;

20. Depreciation records on all company equipment whether these records are maintained by the company involved, its accountant, or others;

21. If a source other than depreciation records is used to develop costs for Contractor's internal purposes in establishing the actual cost of owning and operating equipment, all such other source documents;

22. All non-privileged documents which relate to each and every Claim together with all documents which support the amount of any adjustment in the Contract Sum or Contract Time sought by each Claim;

23. Work sheets or software used to prepare and establish the cost components for items of the Claim, including but not limited to labor, benefits and insurance, materials, equipment, Subcontractors, all documents that establish the time periods, individuals involved, the hours for the individuals, and the rates for the individuals;

24. Work sheets, software, and all other documents used by Contractor to prepare its bid;

25. The above items for its Subcontractors; and

26. Any other information in any form or media not expressly protected from discovery by applicable law.

K. Contractor to cooperate and provide facilities for audit: The audit may be performed by employees or representatives of Owner. Contractor and its Subcontractors shall provide adequate facilities acceptable to Owner for the audit during normal business hours. Contractor and all Subcontractors shall make a good faith effort to cooperate with Owner's auditors.

L. Reciprocal RCW 42.56 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 Contract and shall constitute a waiver of all Claims by Contractor and any Subcontractor that does not fully comply.

PART 9 - TERMINATION OF THE WORK

9.01 TERMINATION BY OWNER FOR CAUSE

A. 7 Day Notice to Terminate for Cause: Owner may, upon 7 Days written notice to Contractor and to its surety, terminate (without prejudice to any right or remedy of Owner) the Work, or any part of it, for cause upon the occurrence of any one or more of the following events:

1. Contractor fails to prosecute Work: Contractor fails to prosecute the Work or any portion thereof with sufficient diligence to ensure Substantial Completion of the Work within the Contract Time;

2. Contractor bankrupt: Contractor is adjudged bankrupt, makes a general assignment for the benefit of its creditors, or a receiver is appointed on account of its insolvency;

3. Contractor fails to correct Work: Contractor fails in a material way to replace or correct Work not in conformance with the Contract Documents;

4. Contractor fails to supply workers or materials: Contractor repeatedly fails to supply skilled workers or proper materials or equipment;

5. Contractor failure to pay Subcontractors or labor: Contractor repeatedly fails to make prompt payment due to Subcontractors or for labor;

6. Contractor violates laws: Contractor materially disregards or fails to comply with laws, ordinances, rules, regulations, or orders of any public authority having jurisdiction; or

7. Contractor in material breach of Contract: Contractor is otherwise in material breach of any provision of the Contract Documents.

B. Owner's actions upon termination: Upon termination, Owner may at its option:

1. Take possession of Project site: Take possession of the Project site and take possession of or use all materials, equipment, tools, and construction equipment and machinery thereon owned by Contractor to maintain the orderly progress of, and to finish, the Work;

2. Accept assignment of Subcontracts: Accept assignment of subcontracts pursuant to Section 5.20; and

3. Finish the Work: Finish the Work by whatever other reasonable method it deems expedient.

C. Surety's role: Owner's rights and duties upon termination are subject to the prior rights and duties of the surety, if any, obligated under any bond provided in accordance with the Contract Documents.

D. Contractor's required actions: When Owner terminates the Work in accordance with this section, Contractor shall take the actions set forth in paragraph 9.02B, and shall not be entitled to receive further payment until the Work is accepted.

E. Contractor to pay for unfinished Work: Contractor shall not be entitled to receive further payment until the Work is finished. If the unpaid balance of the Contract Sum exceeds the cost of finishing the Work, including compensation for A/E's services and expenses made necessary thereby and any other extra costs or damages incurred by Owner in completing the Work, or as a result of

Contractor's actions, such excess shall be paid to Contractor. If such costs exceed the unpaid balance, Contractor shall pay the difference to Owner. These obligations for payment shall survive termination.

F. Contractor and Surety still responsible for Work performed: Termination of the Work in accordance with this section shall not relieve Contractor or its surety of any responsibilities for Work performed.

G. Conversion of "Termination for Cause" to "Termination for Convenience": If Owner terminates Contractor for cause and it is later determined that none of the circumstances set forth in paragraph 9.01A exist, then such termination shall be deemed a termination for convenience pursuant to Section 9.02.

9.02 TERMINATION BY OWNER FOR CONVENIENCE

A. Owner Notice of Termination for Convenience: Owner may, upon written notice, terminate (without prejudice to any right or remedy of Owner) the Work, or any part of it, for the convenience of Owner.

B. Contractor response to termination Notice: Unless Owner directs otherwise, after receipt of a written notice of termination for either cause or convenience, Contractor shall promptly:

1. Cease Work: Stop performing Work on the date and as specified in the notice of termination;

2. No further orders or Subcontracts: Place no further orders or subcontracts for materials, equipment, services or facilities, except as may be necessary for completion of such portion of the Work as is not terminated;

3. Cancel orders and Subcontracts: Cancel all orders and subcontracts, upon terms acceptable to Owner, to the extent that they relate to the performance of Work terminated;

4. Assign orders and Subcontracts to Owner: Assign to Owner all of the right, title, and interest of Contractor in all orders and subcontracts;

5. Take action to protect the Work: Take such action as may be necessary or as directed by Owner to preserve and protect the Work, Project site, and any other property related to this Project in the possession of Contractor in which Owner has an interest; and

6. Continue performance not terminated: Continue performance only to the extent not terminated.

C. Terms of adjustment in Contract Sum if Contract terminated: If Owner terminates the Work or any portion thereof for convenience, Contractor shall be entitled to make a request for an equitable adjustment for its reasonable direct costs incurred prior to the effective date of the termination, plus reasonable allowance for overhead and profit on Work performed prior to termination, plus the reasonable administrative costs of the termination, but shall not be entitled to any other costs or damages, whatsoever, provided however, the total sum payable upon termination shall not exceed the Contract Sum reduced by prior payments. Contractor shall be required to make its request in accordance with the provisions of Part 7.

D. Owner to determine whether to adjust Contract Time: If Owner terminates the Work or any portion thereof for convenience, the Contract Time shall be adjusted as determined by Owner.

9.03 TERMINATION BY CONTRACTOR FOR CAUSE

A. Contractor termination: Except as provided by RCW 60.28.080, Contractor may terminate the Contract 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 permanently;

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

3. Because Owner has improperly not made payment of undisputed amounts within the time stated in the Contract Documents; or

4. The Work is stopped for a period of 60 consecutive Days through no act or fault of Contractor, a Subcontractor, or their agents or employees or any other persons or entities performing portions of the Work under direct or indirect contract with Contractor,

B. Contractor termination procedure: If one of these reasons exists, Contractor may, upon seven Days' written Notice to Owner (during which period Owner has the opportunity to cure), terminate the Contract and recover from Owner payment for Work executed in accordance with the Contract Documents, including reasonable overhead and profit on Work executed and costs incurred by reason of such termination. The total recovery of Contractor shall not exceed the unpaid balance of the Contract Sum.

PART 10 - MISCELLANEOUS PROVISIONS

10.01 GOVERNING LAW

Applicable law and venue: The Contract Documents and the rights of the parties herein shall be governed by the internal laws of the state of Washington, without regard to its choice-of-law provisions. Venue shall be in the county in which the Project is located, unless otherwise specified.

10.02 SUCCESSORS AND ASSIGNS

Bound to successors; Assignment of Contract: Owner and Contractor respectively bind themselves, their partners, successors, assigns, and legal representatives to the other party hereto and to the partners, successors, assigns, and legal representatives of such other party in respect to covenants, agreements, and obligations contained in the Contract Documents. Neither party shall assign the Contract without written consent of the other, except that Contractor may assign the Work for security purposes to a bank or lending institution authorized to do business in the state of Washington. If either party attempts to make an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations set forth in the Contract Documents. If a majority of the ownership or the control of Contractor is acquired by a third party, and such acquisition reasonably imperils performance or creates a conflict of interest that Owner, in its sole discretion, cannot reasonably reconcile, then Owner may terminate this Contract at any time for cause under Section 9.01.

10.03 MEANING OF WORDS

Meaning of words used in Contract Documents: 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. Reference to standard Specifications, manuals, or codes of any technical society, organization, or association, or to the code of any governmental authority, whether such reference is specific or by implication, shall be to the latest

standard specification, manual, or code in effect on the date for submission of bids, except as may be otherwise specifically stated. Wherever in the Drawings and Specifications an article, device, or piece of equipment is referred to in the singular manner, such reference shall apply to as many such items as are shown on the Drawings, or required to complete the installation.

10.04 RIGHTS AND REMEDIES

A. No waiver of rights: Waiver of any provisions of the Contract Documents must be in writing and authorized by Owner. No other waiver is valid on behalf of Owner. No action, delay in acting, or failure to act by Owner or A/E shall constitute a waiver of a right or duty afforded under the Contract Documents, nor shall action, delay in acting, or failure to act constitute approval or an acquiescence in a breach therein, or otherwise prejudice the right of Owner to enforce a right or remedy at any subsequent time, except as may be specifically agreed in writing.

B. Rights under Contract do not limit other rights: 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.

C. If portion of Contract is void, remainder is enforceable: If any portion of this Contract is held to be void or unenforceable, the remainder of the Contract shall be enforceable without such portion.

10.05 CONTRACTOR REGISTRATION AND COMPLIANCE

A. Contractor must be registered and licensed: Pursuant to RCW 39.06, Contractor shall be registered and licensed as required by the laws of the State of Washington, including but not limited to RCW 18.27. Contractor shall also have a current state unified business identifier number; have industrial insurance coverage for Contractor's employees working in Washington as required in Title 51 RCW; have an employment security department number as required in Title 50 RCW; have a state excise tax registration number as required in Title 82 RCW; and not be disqualified from bidding on any public works contract under RCW 39.06.010 (unregistered or unlicensed contractors) or RCW 39.12.065(3) (prevailing wage violations).

B. Employer contributions: Pursuant to RCW 50.24, "Contributions by Employers," in general and RCW 50.24.130 in particular, Contractor shall pay contributions for wages for personal services performed under this Contract or arrange for a bond acceptable to the Commissioner.

C. Apprenticeship requirements: If the Contract Sum for the Project exceeds one million dollars, Contractor shall comply with all applicable apprenticeship requirements.

10.06 TIME COMPUTATIONS

Computing time: When computing any period of time, the day of the event from which the period of time begins shall not be counted. The last day is counted unless it falls on a weekend or legal holiday, in which event the period runs until the end of the next day that is not a weekend or holiday. When the period of time allowed is less than 7 days, intermediate Saturdays, Sundays, and legal holidays are excluded from the computation.

10.07 RECORDS RETENTION

Six year records retention period: The wage, payroll, and cost records of Contractor, and its Subcontractors, and all records subject to audit in accordance with Section 8.03, shall be retained for a period of not less than 6 years after the date of Final Acceptance.

10.08 THIRD-PARTY AGREEMENTS

No third party relationships created: The Contract Documents shall not be construed to create a contractual relationship of any kind between: A/E and Contractor; Owner and any Subcontractor; or any persons other than Owner and Contractor.

10.09 ANTITRUST ASSIGNMENT

Contractor assigns overcharge amounts to Owner: Owner and Contractor recognize that in actual economic practice, overcharges resulting from antitrust violations are in fact usually borne by the purchaser. Therefore, Contractor hereby assigns to Owner any and all claims for such overcharges as to goods, materials, and equipment purchased in connection with the Work performed in accordance with the Contract Documents, except as to overcharges which result from antitrust violations commencing after the Contract Sum is established and which are not passed on to Owner under a Change Order. Contractor shall put a similar clause in its Subcontracts, and require a similar clause in its sub-Subcontracts, such that all claims for such overcharges on the Work are passed to Owner by Contractor.

10.10 HEADINGS AND CAPTIONS

Headings for convenience only: All headings and captions used in these General Conditions are only for convenience of reference, and shall not be used in any way in connection with the meaning, effect, interpretation, construction, or enforcement of the General Conditions, and do not define the limit or describe the scope or intent of any provision of these General Conditions.

10.11 INDEPENDENT CONTRACTOR

Contractor is independent contractor: Contractor shall be and operate as an independent contractor in the performance of the Work and shall have complete control over and responsibility for all personnel performing the Work. Contractor is not authorized to enter into any agreements or undertakings for or on behalf of Owner or to act as or be an agent or employee of Owner.

10.12 OWNER'S ROLE

Owner's role is limited. Owner 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 Contractor's responsibility under the Contract Documents. The presence of Owner at the Project site shall not in any manner be construed as assurance that the Work is being completed in compliance with the Contract Documents, nor as evidence that any requirement of the Contract Documents of any kind, including Notice, has been met or waived. Owner will not be responsible for Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. Owner will not have control over or charge of and will not be responsible for acts or omissions of Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

END OF SECTION 00 72 00

September 27, 2022

Attention: Craig Cole
Project Manager
WSU Facilities Services - Capital

Subject: Good Faith Asbestos Survey
Chilled Water Upgrades
Consolidated Information Center (CIC) #9502
Washington State University
Richland, Washington
Job No. 1744-2022

From: Matthew McKibbin
Industrial Hygienist
WSU Environmental Health and Safety

Extensive upgrades are planned to the chilled water system located in the Consolidated Information Center (CIC), which was built in 1997 on Washington State University's (WSU) Tri-Cities campus. The scope of work includes demolition of the exterior chiller unit, adjacent supply/return piping as well as pumps, valves and associated electrical equipment in the adjacent mechanical rooms. Sampling was conducted by Environmental Health and Safety (EH&S) to meet "Good Faith" asbestos survey requirements for the project and is summarized in this report. Samples were collected by Matthew McKibbin, AHERA Building Inspector, on September 22, 2022.

SCOPE OF WORK

The survey scope of work was limited to the work identified in the 100% design drawings by MSI Engineers dated July 7, 2022. The scope of services for the Limited Good Faith survey included the following tasks:

- Perform a limited "Good Faith" asbestos survey of the Project Area using non-destructive methods to identify the presence, location, and quantity of asbestos-containing materials (ACM) and presumed asbestos-containing material (PACM) that may be impacted by the proposed project.
- Perform the asbestos survey in reference to the "Good Faith" asbestos survey requirements in the Washington Administrative Code (WAC) 296-62-07721, and in reference to the requirements of USEPA AHERA/ASHARA 40 CFR 763.
- Analyze samples by a National Voluntary Laboratory Accreditation Program (NVLAP) accredited laboratory for the presence and quantity of asbestos. Samples are analyzed using polarized light microscopy (PLM) Environmental Protections Agency (EPA) Method 600/R-93/116.

LIMITATIONS OF THE ASSESSMENT

The conclusions within this report are professional opinions based solely upon visual site observations and interpretations of analytical data as described in this report. Destructive sampling was used during the limited survey of the Project Area. Typical construction techniques can render portions of the structure inaccessible. As a result, additional asbestos-containing materials (ACM) may be present in inaccessible areas (e.g., enclosed wall cavities, ceiling spaces). Suspect regulated materials within inaccessible areas should be assumed to contain asbestos until characterized. If suspect ACM not identified in this report are found during demolition/renovation and/or construction stop work that may impact these materials and contact a project officer.

The opinions presented herein apply to the site conditions existing at the time of the investigation, and interpretation of current regulations pertaining to asbestos. Opinions and recommendations provided herein may not apply to future conditions that may exist at the site. Regulatory requirements in effect at the time of the work should be verified prior to any work that impacts regulated materials. This report represents the findings of this survey only, and is not intended to establish scope or contractual terms to regulated material abatement.

ASBESTOS SURVEY METHODOLOGY

Suspect ACM was grouped into homogeneous sampling areas (HSA) and categorized according to 40 CFR 763, as thermal systems insulation (TSI), surfacing material, or miscellaneous material. The sampling plan included, at a minimum, the collection and analysis of samples as follows:

Thermal System Insulation

- In a distributive manner, a minimum of three samples of each HSA that was not presumed to contain asbestos.
- At least one bulk sample from each homogeneous area of patched TSI if the patch was less than 6 square feet.
- In a manner sufficient to determine whether the material is ACM, samples were collected from plaster/mudded pipe fitting insulation.

Surfacing Material

- In a distributive manner, a minimum of three samples collected from each homogeneous area that was 1,000 square feet or less.
- A minimum of five samples collected from each homogeneous area that was greater than 1,000 square feet but less than or equal to 5,000 square feet.
- A minimum of seven samples collected from each homogeneous area that was greater than 5,000 square feet.

Miscellaneous Material

- In a distributive manner as deemed sufficient by the Inspector. At least one sample was collected of each suspect miscellaneous material not presumed to contain asbestos.

Non-Suspect Materials

- Fiberglass, wood, metal, or other generally recognized non-ACM were not sampled.

Asbestos bulk samples and chain-of-custody forms were delivered to EHS Laboratories in Richmond, Virginia for analysis. Each sample was analyzed using PLM/dispersion staining in accordance with EPA Method 600/R-93/116. The detection limit for this type of analysis is approximately one percent (by volume). Materials containing more than one percent asbestos are considered to be ACM.

RESULTS

Asbestos
Three (3) bulk samples of gypsum wallboard and joint compound were collected as part of our survey. None of the materials were found to contain asbestos.

WSU EH&S collected samples in mechanical room 116. Exterior pipes are insulated with a non-suspect black foam and rubberized tape while interior pipes were insulated with fiberglass. Pipe flange gaskets were observed to be red rubber material and not suspected to contain asbestos. Asbestos survey sample numbers, material descriptions, sample locations and analytical results are provided in Table 1 below. Sample locations are provided on the attached figure.

Lead
Paint coatings were not sampled for lead and are assumed to be lead-containing. Industrial paints which typically have significant quantities of lead were not observed on the stainless steel exterior chiller components; however, may be present underneath insulation. Interior latex paints are present on the interior wallboard walls which were limited for lead content by the Consumer Product Safety Commission when the building was constructed in 1997.

CONCLUSIONS

A copy of this report must be provided to any entity bidding on work for the project. A copy of this report must also be on site during any demolition, renovation and/or construction activities at the site.

Contractors should use caution during construction even after asbestos abatement activities, as concealed ACM that has not previously been evaluated for asbestos may be encountered. Inaccessible concealed spaces (e.g., expansion joints, enclosed ceiling spaces etc.) that have not been surveyed for ACM, and should be presumed to contain asbestos until destructive sampling is performed in those areas.

Materials that have been shown to contain detectable levels of lead are regulated due to the potential for occupational exposure to lead if these materials are disturbed. Projects that may disturb lead require employers to evaluate worker/project personnel exposure to lead and prevent exposure above the permissible exposure limit (PEL).

TABLE 1
SUMMARY OF ASBESTOS SAMPLING
Consolidated Information Center

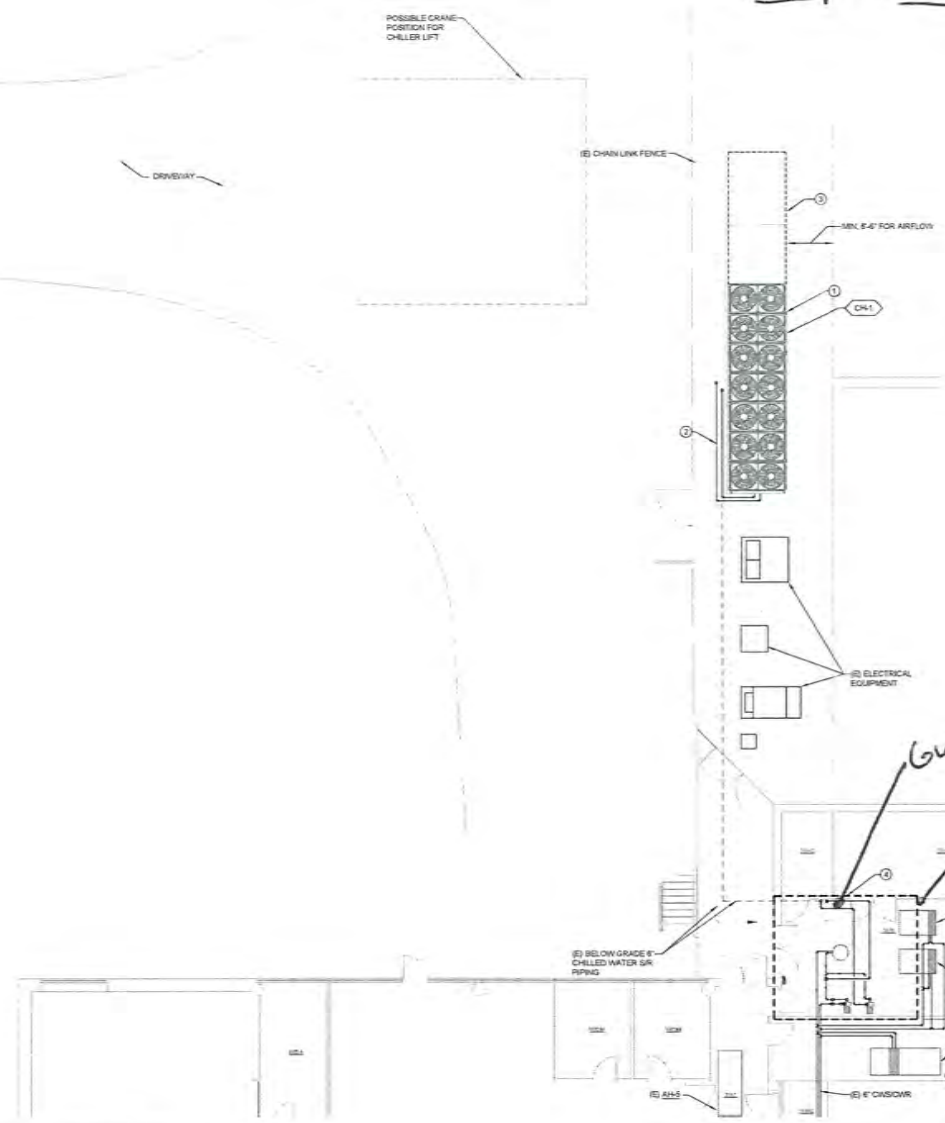
Sample #	Building Name	Building #	Sample Location (Room #)	Material	Material Description	Type	Quantity	Quantity Descriptor	Sample Results	ACM
GWB-1A	CIC	9502	116	Wallboard system	Layer 1: Gypsum wallboard Layer 2: Joint compound	Misc	10,000	SF	Layer 1: ND Layer 2: ND	No
GWB-1B	CIC	9502	116	Wallboard system	Layer 1: Gypsum wallboard Layer 2: Joint compound	Misc	10,000	SF	Not analyzed	No
GWB-1C	CIC	9502	116	Wallboard system	Layer 1: Gypsum wallboard Layer 2: Joint compound	Misc	10,000	SF	Layer 1: ND Layer 2: ND	No

Notes:

a) All asbestos analytical results are reported as percent asbestos per volume of bulk material sampled, as determined by U.S EPA Method 600/R-93/116.
b) SF = Square feet
c) ND = No asbestos detected
d) Misc. = Miscellaneous material

FIGURE

Sample Locations

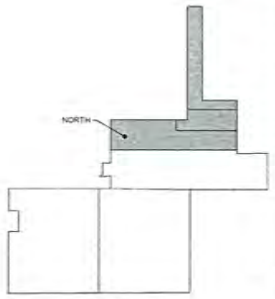


GENERAL NOTES

1. REFER TO PIPING DIAGRAM ON MA-501.
2. REFER TO TAB AND CX NOTES ON MA-501.

KEY NOTES

1. INSTALL NEW CHILLER ON EXISTING CHILLER PAD, SEE DETAIL 4/MA-501.
2. CONNECT EXISTING 6" CHW TO NEW CHILLER, SEE DETAIL 3/MA-501.
3. HEAT EXCHANGER SERVICE ACCESS, KEEP CLEAR.
4. SEE ENLARGED MECHANICAL ROOM PLAN ON MA-203 AND ISO VIEW ON 7/MA-502.



KEY PLAN

N 1 FIRST FLOOR NORTH - MECHANICAL
Scale: 1/8"=1'

DESIGN FIRM:

MSI ENGINEERS

CONSULTANTS:

PROVISIONAL STAMP:

WASHINGTON STATE UNIVERSITY

Facilities Services
2425 E. Grimes Way
Pullman, Wa. 99164-1150

PH: 509-335-5571
FAX: 509-335-9064

CONSOLIDATED INFORMATION CENTER (CIC)

CHILLED WATER UPGRADES

9512

MARK	DATE	DESCRIPTION
	07-07-2022	100% CD FOR OWNER REVIEW
	05-16-2022	90% CD FOR CHW-CR REVIEW

CAD DWG FILE: MA-101	
DESIGN BY: ASD	
DRAWN BY: JC	CHECKED BY: ASD
PROJECT No. 1744-2022	FILE No. TBD
COPYRIGHT: WASHINGTON STATE UNIVERSITY	

SHEET TITLE

FIRST FLOOR NORTH MECHANICAL

M-201

SHEET 7 OF 19 SHEETS

FILE P:\2021\21-61\Cad\21-61 MA201.dwg PLOT DATE: October 1, 2015, 7:47 AM ORIGINAL PAPER SIZE: 22" x 34"

CHAIN-OF-CUSTODY
AND
LABORATORY ANALYTICAL REPORTS

Asbestos Bulk Analysis Report

Environmental Hazards Services, L.L.C.
7469 Whitepine Rd
Richmond, VA 23237
Telephone: 800.347.4010

Report Number: 22-09-04742

Client: Washington State University - Pullman
P.O. BOX 641172
Pullman, WA 99164

Received Date: 09/26/2022
Analyzed Date: 09/27/2022
Reported Date: 09/27/2022

Project/Test Address: Tricities CIC Chiller; Pullman, WA

Client Number: 49-3308

Fax Number: 509-335-4442

Laboratory Results

Lab Sample Number	Client Sample Number	Layer Type	Lab Gross Description	Asbestos	Other Materials
22-09-04742-001	GWB-1A		White Powdery; Brown Fibrous; Inhomogeneous	NAD	15% Cellulose 2% Fibrous Glass 83% Non-Fibrous
22-09-04742-002	GWB-1B			Did Not Analyze (Sample Container Empty)	
22-09-04742-003	GWB-1C		White Powdery; Brown Fibrous; Inhomogeneous	NAD	15% Cellulose 2% Fibrous Glass 83% Non-Fibrous

Environmental Hazards Services, L.L.C

Client Number: 49-3308 Report Number: 22-09-04742

Project/Test Address: Tricities CIC Chiller; Pullman, WA

Lab Sample Number	Client Sample Number	Layer Type	Lab Gross Description	Asbestos	Other Materials

QC Sample: 57-M22009-1

QC Blank: SRM 1866 Fiberglass

Reporting Limit: 1% Asbestos

Method: EPA Method 600/R-93/116, EPA Method 600/M4-82-020

Analyst: Kathy Fletcher

Reviewed By Authorized Signatory:

Tasha Eaddy
QA/QC Clerk

The condition of the samples analyzed was acceptable upon receipt per laboratory protocol unless otherwise noted on this report. Each distinct component in an inhomogeneous sample was analyzed separately and reported as a composite. Results represent the analysis of samples submitted by the client. Sample location, description, area, volume, etc., was provided by the client. This report cannot be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government. This report shall not be reproduced except in full, without the written consent of the Environmental Hazards Service, L.L.C. California Certification #2319 NY ELAP #11714 NVLAP #101882-0 VELAP 460172. All information concerning sampling location, date, and time can be found on Chain-of-Custody. Environmental Hazards Services, L.L.C. does not perform any sample collection.

Environmental Hazards Services, L.L.C. recommends reanalysis by point count (for more accurate quantification) or Transmission Electron Microscopy (TEM), (for enhanced detection capabilities) for materials regulated by EPA NESHAP (National Emission Standards for Hazardous Air Pollutants) and found to contain less than ten percent (<10%) asbestos by polarized light microscopy (PLM). Both services are available for an additional fee.

400 Point Count Analysis, where noted, performed per EPA Method 600/R-93/116 with a Reporting Limit of 0.25%.

* All California samples analyzed by Polarized Light Microscopy, EPA Method 600/M4-82-020, Dec. 1982.

LEGEND: NAD = no asbestos detected

EHS Laboratories™

Environmental Hazards Services, LLC

www.leadlab.com
(800)347-4010
(804)275-4907 (fax)

7469 Whitepine Rd
Richmond, VA
23237

Asbestos Chain-of-Custody

22-09-04742

Due Date:
09/27/2022
(Tuesday)
AE
3PLM

Company Name: Washington State University Health and Safety Address: P.O. Box 641172 City/State/Zip: Pullman, WA 99164

Phone: (509) 335-5604 Fax: ( ) E-mail: WSU List Acct. Number: 49-3308 D

Project Name / Testing Address: Tricities CIC Chiller City/State (Required): Pullman, WA

Collected by: Matthew McKibbin Purchase Order Number: 2023-006245

Turn Around Times : *If no TAT is specified, sample(s) will be processed and charged as 3-day TAT.*

✓ 1 - Day _____ 2 - Day _____ 3 - Day _____ Same Day (Must Call Ahead) _____ Weekend (Must Call Ahead)

No.	Client Sample ID	Date Collected	ASBESTOS							AIR					COMMENTS
			PLM	PLM Point Count 400	PLM Point Count 1000	PLM NY Protocol	PCM	TEM Chatfield (Bulk)	TEM AHERA (Air)	Time On	Time Off	Flow Rate (L/min)	Total Time (minutes)	Volume (Total Liters)	
1	GWB-1A	9/22/22	✓												Rm 116 - Gyp wallboard
2	GWB-1B *	"	✓												"
3	GWB-1C	"	✓												"
4															
5															
6															* Recd sample
7															bag for GWB-1B,
8															but did not
9															contain any sample
10															JR 9/26/22

Released by: Matt McKibbin Signature: Date/Time: 9/23/22 1241

Received by: Amy Wegner Signature: Date/Time: 9/23/22

* 9/26/22

LABORATORY ACCREDITATION CERTIFICATE

United States Department of Commerce
National Institute of Standards and Technology

Certificate of Accreditation to ISO/IEC 17025:2017

NVLAP LAB CODE: 101882-0

Environmental Hazards Services, L.L.C.

North Chesterfield, VA

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

Asbestos Fiber Analysis

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

2022-01-01 through 2022-12-31

Effective Dates

For the National Voluntary Laboratory Accreditation Program

National Voluntary Laboratory Accreditation Program

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

Environmental Hazards Services, L.L.C.
7469 Whitepine Road
North Chesterfield, VA 23237-2261
Ms. Julie Dickerson
Phone: 804-275-4788 Fax: 804-275-4907
Email: jdickerson@leadlab.com
http://www.leadlab.com

ASBESTOS FIBER ANALYSIS **NVLAP LAB CODE 101882-0**

Bulk Asbestos Analysis

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

For the National Voluntary Laboratory Accreditation Program

AHERA BUILDING INSPECTOR CERTIFICATES

Certificate of Completion

This is to certify that

Matthew McKibbin

has satisfactorily completed
4 hours of online refresher training as an

AHERA Building Inspector

to comply with the training requirements of
TSCA Title II, 40 CFR 763 (AHERA)

EPA Provider # 1085

184834
Certificate Number

ARGUS PACIFIC
TRAINING • CONSULTING
A Terracon COMPANY

Apr 22, 2022 Expires in 1 year.
Date(s) of Training

Exam Score: N/A
(if applicable)

Instructor: Andre Zwanenburg

ARGUS PACIFIC, INC / 21905 64th AVE W, SUITE 100 / MOUNTLAKE TERRACE, WASHINGTON 98043 / 206.285.3373 / ARGUSPACIFIC.COM

PART 1 GENERAL

1.01 SUMMARY

A. Contractor shall perform the entire Work in accordance with the Contract Documents.

B. Without limiting the requirements of the Contract Documents, the Work of the Contract can be summarized as follows:

1. This project involves the removal of the existing 17,400lb chiller from the CIC, including capturing 500lb of R-22 refrigerant. Remove old chilled water piping to accommodate removal of the chiller and installation of new equipment. Remove pumps, piping, valves, and other associated equipment inside of the mechanical room to accommodate new equipment. Install new air-cooled high efficiency chiller and associated equipment on the existing pad outside and pipe the chilled water into the building, replacing the necessary pumps, valves, and other equipment. Remove and replace necessary electrical lines and equipment to support the new chiller.

1.01 SCHEDULE OF ALTERNATES – NOT USED

1.02 SCHEDULE OF ALLOWANCES – NOT USED

1.03 SCHEDULE OF UNIT PRICES – NOT USED

1.04 GENERAL INFORMATION

A. Owner and Owner's Designated Representative:

1. Owner: Board of Regents
Washington State University
Pullman, WA 99164-1045

2. Owner's Designated Representative:

a. All Owner capital projects are administered by the Department of Facilities Services, Capital. Project specific designated representatives are listed within the Agreement.

3. Consulting Services: Owner has retained an Architect/Engineer to design the entire Project. The Architect/Engineer is identified below:

a. Architect/Engineer: MSI Engineers, Inc., Spokane, WA

1.05 SPECIAL CONDITIONS

A. Site Access: The North Parking Lot Fire Lane must not be blocked at any time.

B. Schedule and Phasing: The entire project must be completed by June 1, 2023.

END OF SECTION 01 11 00

PART 1 GENERAL

1.01 SUMMARY

A. This Section includes the administrative and procedural requirements for executing changes in the Work. This Section is subject to and governed by the Agreement and General Conditions. In the event of any conflict, the Agreement and General Conditions will have a higher precedence as established in the General Conditions.

1.02 SUBMITTALS

A. Contractor shall submit a breakdown of its actual wage rates prior to commencement of construction activities. The breakdown must show:

1. Basic wage rate (Based on L&I Intent to Pay Prevailing Wages);
2. Fringe Package (Based on L&I Intent to Pay Prevailing Wages);
3. FUI (Federal Unemployment Insurance);
4. FICA (Federal Insurance Compensation Act);
5. SUI (State Unemployment Compensation Act);
6. Medicare; and
7. WC (Workers Compensation).

B. Contractor shall submit detailed supporting documentation to verify the above rates, if requested by Owner. All such rates shall be subject to audit.

C. Contractor shall submit prior to commencement of construction activities a list of all equipment that it anticipates will be used on the Project and the actual operating cost of each piece of equipment. The General Conditions describe allowable equipment charges. All costs shall be subject to audit.

1.03 CONTRACT CHANGE PROPOSAL PROCEDURES

A. Contractor shall maintain an Issues Log/ CCP Log as described in the General Conditions:

1. The action status shall indicate which party is currently responsible and when it is appropriate to submit a CCP to Owner. Contractor shall submit a Contract Change Proposal (CCP) with Substantiating Documentation, as described in subsection C below, to Owner within 7 Days of this action status change.
2. Upon final agreement and authorization by Owner a CCP may be incorporated into the Contract via Change Order and shall be reflected on the Issues Log.

B. Direction to perform Work:

1. Owner may directly order Work by a written Work Directive (WD). WDs may be unilateral or bilateral as described in the General Conditions and may be issued on a fixed price or on a "cost-not-to-exceed" basis. The WD may include the following:

   a. A detailed description of the proposed change, products, and location of modification to the Work;

   b. Supplementary or revised Drawings and/or Specifications; and

   c. Projected time for making the change and a statement as to whether overtime work is, or is not, acceptable.

C. Substantiating Documentation required with all CCPs:

1. Contractor shall provide back-up documentation required to substantiate any proposed change in the following format:

   a. CCP narrative, including:

      1) Description of proposed change. In order to allow for efficient review of a change proposal Contractor shall provide enough narrative to the line item breakdown to allow Owner to properly assess that the change is fair and reasonable;

      2) Cause of or reason for making change with a statement of why proposed change is not covered by Contract Documents

      3) Both credited and additive elements relating to a change in Contract Sum and/or Contract Time;

      4) A specific period of time during which Contractor's pricing will be considered valid;

      5) Any schedule considerations that may trigger further impact to the Contract Time if acceptance of the proposed change if delayed beyond a specific date; and

      6) Date change Work is to be completed.

   b. Owner supplied Change Proposal Submittal Form.

   c. CCP Cost Estimate Detail Sheet(s), or other form acceptable to Owner, including:

      1) Line-item estimate detailing material, labor, equipment, Subcontractor, and supplier costs and quantities; and

      2) Subcontractor and supplier proposals with supporting line-item estimates.

   d. CCP Progress Schedule with Contemporaneous Period Analysis detailing if any impact to the planned progress of the Work and

critical path.

e. Other supporting documentation, as appropriate.

D. Correlation with Contractor's Submittals:

1. Application for Payment forms shall record each Unilateral and Bilateral Change Order as a separate item of Work.
2. The Progress Schedule shall be revised to reflect changes in the Contract Time.
3. Project Record shall incorporate all changed Work.

END OF SECTION 01 26 00

PART 1 GENERAL

1.01 SUMMARY

A. This Section includes procedures for preparation and submittal of Applications for Payment.

1.02 SUBMITTALS

A. Prior to submitting its first Application for Payment, Contractor shall:

1. Submit a preliminary Progress Schedule per Section 01 32 13 – Progress Schedule.
2. If requested, submit a projected monthly cash-flow analysis for the duration of the Project.
3. Submit an approved Intent to Pay Prevailing Wages form prior to commencing the Work. An approved Intent to Pay Prevailing Wages form must be on file with Owner for each classification of laborers, workers, or mechanics employed by Contractor or Subcontractors whose Work is included in an Application for Payment.
4. "Washington State Prevailing Wage Rates for Public Works Contracts/Benton County" are made a part of the Contract Documents and are included at the end of this Section. It is Contractor's responsibility to verify with the Washington State Department of Labor and Industries the most current and applicable prevailing wage rates for this Project.
5. Submit and receive approval of the Schedule of Values per Section 01 29 73 – Schedule of Values, and the General Conditions. All Applications for Payment shall be in the same format.
6. Submit a list of all Subcontractors with points of contact and other contact information, including phone number, email address, and mailing address.
7. Submit a list of all major material suppliers with points of contact and other contact information, including phone number, email address, and mailing address.
8. Submit Retainage Option Form to Owner for the disposition of retainage funds.
    a. In accordance with Chapter 60.28 of the Revised Code of Washington (RCW), Owner shall reserve retainage not to exceed 5% of the monies earned by Contractor as a trust fund for the protection and payment of:
        1) The claims of any person and/or Owner arising out of or relating to Work performed on the Project; and
        2) The State with respect to taxes, fees, or penalties that may

be imposed and due from Contractor (see General Conditions).

b. Retainage will be released per Section 01 70 00 - Project Close-Out.

c. At the option of Contractor, the moneys reserved by Owner shall be:

1) Retained in a fund by Owner;

2) Bonded for all of the retainage using a bond form acceptable to Owner;

3) Placed in escrow with a bank or trust company by Owner.

a) Escrow: If the retained funds are to be placed in escrow, Contractor will select the escrow agent, subject to approval by Owner. The selected agent must be a bank or trust company in the State of Washington.

b) Escrow Agent: If Contractor elects the escrow option, an escrow agreement shall be executed by Contractor, Owner, and bank or trust company. Three copies of the agreement should be completed and executed by Contractor and returned to Owner for execution; Owner will forward copies to the bank or trust company for receipt, acceptance, and execution. The bank or trust company will retain one copy and return one copy each to Contractor and Owner. A completed and signed escrow agreement must be on file with Owner before Contractor's first Application for Payment is processed.

c) Escrow Investments: The bank or trust company may invest the retained funds in bonds and other securities selected by Contractor, except stocks, subject to the written approval of Owner.

d) The investments selected must mature on or prior to the date 45 Days following Final Acceptance of the Work. Interest on such investments may be paid to Contractor as it accrues.

e) Escrow Costs and Fees: All escrow costs and fees shall be paid by Contractor.

f) Release of Escrow Investments to Contractor: Retainage will be released per Section 01 70 00 - Project Close-Out. Once Contractor has fully complied with the Contract Documents and statute, Owner shall issue written instructions to the bank or trust company to release to Contractor the investment held in escrow.

B. Draft Application for Payment:

1. Contractor shall submit a draft, itemized Application for Payment within the last 7 Days of the month.

2. The draft application does not constitute a payment request and shall not be signed.

3. Contractor shall carefully check all extensions, totals, and required information for accuracy before submittal.

4. Contractor and Owner may meet to confer regarding the current progress of the Work and the amount of payment to which Contractor is entitled. Owner may request that Contractor provide supporting documentation substantiating its right to payment. Contractor is not entitled to make a final payment request, nor is any payment due Contractor, until such data is furnished. Contractor may include in its Application for Payment projected costs to the end of the month.

    a. Fill in the following information within Owner's Application for Payment form:

        1) Percentage of Work completed based upon the approved schedule of values.

        2) List Change Orders approved by Owner prior to submission date. Use Owner's designations. Do not bill for changed Work until a fully executed Change Order has been received.

        3) Certification of Participation WBE and MBEs, all certification types acceptable, supply this regardless of having firms to report upon.

        4) List all Subcontractors that have performed Work at the site during the pay period.

        5) If applicable, Apprentice/Journeyman Participation.

5. Contractor shall submit or make available for review the following prior to the draft Application for Payment:

    a. Project Record; (see Section 01 78 39 – Project Record)

    b. Updated Progress Schedule in native format (see section 01 32 13 – Progress Schedule);

    c. Contractor Quality Control Reports (see Section 01 45 00 - Quality Control); and

    d. Stored Materials: Requests for payment of stored materials may only be made for materials properly stored on or off-site and in full compliance with the General Conditions.

C. Application for Payment:

1. Contractor may not submit the approved Application for Payment (or payment will be withheld) until all requirements of the draft application for payment are met.

2. Upon approval of the Draft Application for Payment, contractor will be authorized to submit the agreed upon Application for Payment for processing and payment. This application for payment shall be signed by hand by a responsible officer of the Contractor and may be submitted in scanned format electronically.

3. Formal submittal must include all parts of the Application for Payment form.

4. Owner shall make progress payments in such amounts as it determines are properly due within 30 Days of receipt of a properly executed Application for Payment.

5. Owner shall notify Contractor in accordance with Chapter 39.76 RCW if the Application for Payment does not comply with the requirements of the Contract Documents.

D. Disputed Amounts: If Contractor believes it is entitled to payment for Work performed during the prior calendar month in addition to the agreed-upon amount, Contractor may, also within the same period, submit to Owner along with the approved Application for Payment a separate, written payment request specifying the exact additional amount claimed due, the category in the Schedule of Values in which the payment is claimed due, the specific Work for which the additional amount is due, and why the additional payment is due. Furthermore, for the submittal to be considered, Contractor and all Subcontractors shall file with Owner by the same date certified copies of all payroll records relating to the additional amount due, pursuant to WAC 296-127-320.

E. Payments to Subcontractors: Contractor shall pay each Subcontractor no later than 10 Days after receipt of payment from Owner the amount to which the Subcontractor is entitled. Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to lower-tier Subcontractors in a similar manner.

1. Applications for Payment shall not request payment for portions of the Work that Contractor does not intend to pay a Subcontractor, unless such Work has been performed by others whom Contractor intends to pay.

2. If, after making an Application for Payment but before paying a Subcontractor for its performance covered by the Application, Contractor discovers that part or all of the payment otherwise due to the Subcontractor is subject to withholding from the Subcontractor under the Subcontract (such as for unsatisfactory performance or non-payment of lower-tier Subcontractors), Contractor may withhold the amount as allowed under the Subcontract, but it shall:

a. Give the Subcontractor and Owner written notice of the withholding as soon as practicable once Contractor determines

the cause for the withholding but before the due date of the Subcontractor payment;

b. Include the reasons for the withholding and the actions the Subcontractor must take to release the payment; and

c. Once Subcontractor has taken the required remedial actions, pay Subcontractor within 8 Days.

3. Owner may, at its sole option, issue joint checks to Contractor and to any Subcontractor. If Owner makes payments by joint check, such value shall be reflected on the next Application for Payment.

F. Application for Final Payment:

1. Application for Final Payment will be accepted for processing only after Contractor has completed the requirements of Final Completion as described in Section 01 70 00 – Project Close-Out.

G. Release of Retainage:

1. Retainage will be released per Section 01 70 00 - Project Close-Out.

END OF SECTION 01 29 00

State of Washington
Department of Labor & Industries
Prevailing Wage Section - Telephone 360-902-5335
PO Box 44540, Olympia, WA 98504-4540

Washington State Prevailing Wage

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 Code Key.

Journey Level Prevailing Wage Rates for the Effective Date: 11/08/2022

County	Trade	Job Classification	Wage	Holiday	Overtime	Note	*Risk Class
Benton	Asbestos Abatement Workers	Journey Level	$47.62	7B	1M	8Z	View
Benton	Boilermakers	Journey Level	$72.54	5N	1C		View
Benton	Brick Mason	Journey Level	$55.44	5A	1M		View
Benton	Building Service Employees	Janitor	$14.49		1		View
Benton	Building Service Employees	Shampooer	$14.49		1		View
Benton	Building Service Employees	Waxer	$14.49		1		View
Benton	Building Service Employees	Window Cleaner	$14.49		1		View
Benton	Cabinet Makers (In Shop)	Journey Level	$15.51		1		View
Benton	Carpenters	Acoustical Worker	$53.36	7E	4X	8N	View
Benton	Carpenters	Bridge, Dock & Wharf Carpenter	$57.36	7E	4X	8N	View
Benton	Carpenters	Floor Layer & Floor Finisher	$53.36	7E	4X	8N	View
Benton	Carpenters	Form Builder	$53.36	7E	4X	8N	View
Benton	Carpenters	General Carpenter	$53.36	7E	4X	8N	View
Benton	Carpenters	Heavy Construction Carpenter	$57.36	7E	4X	9E	View
Benton	Carpenters	Scaffold/Shoring Erecting & Dismantling	$57.36	7E	4X	8N	View
Benton	Cement Masons	Journey Level	$52.83	7B	1N		View
Benton	Divers & Tenders	Assistant Tender	$61.33	7E	4X		View
Benton	Divers & Tenders	Bell/Vehicle or Submersible Operator Not Under Pressure	$64.43	7E	4X		View
Benton	Divers & Tenders	Dive Supervisors	$112.37	7E	4X		View
Benton	Divers & Tenders	Diver	$110.87	7E	4X	8V	View
Benton	Divers & Tenders	Diver on Standby	$63.43	7E	4X		View
Benton	Divers & Tenders	Diver Tender	$64.43	7E	4X		View
Benton	Divers & Tenders	Diving Master	$74.42	7E	4X		View
Benton	Divers & Tenders	Manifold Operator	$64.43	7E	4X		View
Benton	Divers & Tenders	Manifold Operator Mixed Gas	$68.43	7E	4X		View
Benton	Divers & Tenders	Remote Operated Vehicle Operator	$64.43	7E	4X		View
Benton	Divers & Tenders	Remote Operated Vehicle	$61.33	7E	4X		View

		Tender/Technician					
Benton	Dredge Workers	Assistant Engineer	$76.56	5D	3F		View
Benton	Dredge Workers	Assistant Mate (Deckhand)	$75.97	5D	3F		View
Benton	Dredge Workers	Boatmen	$76.56	5D	3F		View
Benton	Dredge Workers	Engineer Welder	$78.03	5D	3F		View
Benton	Dredge Workers	Leverman, Hydraulic	$79.59	5D	3F		View
Benton	Dredge Workers	Mates	$76.56	5D	3F		View
Benton	Dredge Workers	Oiler	$75.97	5D	3F		View
Benton	Drywall Applicator	Journey Level	$53.36	7E	4X	8N	View
Benton	Drywall Tapers	Journey Level	$48.58	7E	1P		View
Benton	Electrical Fixture Maintenance Workers	Journey Level	$34.23		1		View
Benton	Electricians - Inside	Cable Splicer	$79.12	5A	11F		View
Benton	Electricians - Inside	Journey Level	$76.43	5A	11F		View
Benton	Electricians - Inside	Welder	$81.81	5A	11F		View
Benton	Electricians - Motor Shop	Craftsman	$15.37		1		View
Benton	Electricians - Motor Shop	Journey Level	$14.69		1		View
Benton	Electricians - Powerline Construction	Cable Splicer	$88.89	5A	4D		View
Benton	Electricians - Powerline Construction	Certified Line Welder	$81.65	5A	4D		View
Benton	Electricians - Powerline Construction	Groundperson	$52.91	5A	4D		View
Benton	Electricians - Powerline Construction	Heavy Line Equipment Operator	$81.65	5A	4D		View
Benton	Electricians - Powerline Construction	Journey Level Lineperson	$81.65	5A	4D		View
Benton	Electricians - Powerline Construction	Line Equipment Operator	$70.02	5A	4D		View
Benton	Electricians - Powerline Construction	Meter Installer	$52.91	5A	4D	8W	View
Benton	Electricians - Powerline Construction	Pole Sprayer	$81.65	5A	4D		View
Benton	Electricians - Powerline Construction	Powderperson	$60.75	5A	4D		View
Benton	Electronic Technicians	Journey Level	$50.82	5I	1B		View
Benton	Elevator Constructors	Mechanic	$103.81	7D	4A		View
Benton	Elevator Constructors	Mechanic In Charge	$112.09	7D	4A		View
Benton	Fabricated Precast Concrete Products	Journey Level	$14.49		1		View
Benton	Fabricated Precast Concrete Products	Journey Level - In-Factory Work Only	$14.49		1		View
Benton	Fence Erectors	Fence Erector	$47.62	7B	1M	8Z	View
Benton	Flaggers	Journey Level	$44.88	7B	1M	8Z	View
Benton	Glaziers	Journey Level	$40.20	7L	4L		View
Benton	Heat & Frost Insulators And Asbestos Workers	Journey Level	$59.24	5K	1U		View
Benton	Heating Equipment Mechanics	Journey Level	$71.93	5A	1X		View
Benton	Hod Carriers & Mason Tenders	Journey Level	$44.89	7B	1M	8Z	View
Benton	Industrial Power Vacuum	Journey Level	$14.49		1		View

	Cleaner						
Benton	Inland Boatmen	Journey Level	$14.49		1		View
Benton	Inspection/Cleaning/Sealing Of Sewer & Water Systems By Remote Control	Cleaner Operator, Foamer Operator	$14.49		1		View
Benton	Inspection/Cleaning/Sealing Of Sewer & Water Systems By Remote Control	Grout Truck Operator	$14.49		1		View
Benton	Inspection/Cleaning/Sealing Of Sewer & Water Systems By Remote Control	Head Operator	$14.49		1		View
Benton	Inspection/Cleaning/Sealing Of Sewer & Water Systems By Remote Control	Technician	$14.49		1		View
Benton	Inspection/Cleaning/Sealing Of Sewer & Water Systems By Remote Control	Tv Truck Operator	$14.49		1		View
Benton	Insulation Applicators	Journey Level	$53.36	7E	4X	8N	View
Benton	Ironworkers	Journeyman	$67.91	7N	1O		View
Benton	Laborers	Air And Hydraulic Track Drill	$48.20	7B	1M	8Z	View
Benton	Laborers	Asphalt Raker	$48.20	7B	1M	8Z	View
Benton	Laborers	Asphalt Roller, Walking	$47.91	7B	1M	8Z	View
Benton	Laborers	Brick Pavers	$47.62	7B	1M	8Z	View
Benton	Laborers	Brush Hog Feeder	$47.62	7B	1M	8Z	View
Benton	Laborers	Brush Machine	$48.20	7B	1M	8Z	View
Benton	Laborers	Caisson Worker, Free AIr	$48.20	7B	1M	8Z	View
Benton	Laborers	Carpenter Tender	$47.62	7B	1M	8Z	View
Benton	Laborers	Cement Finisher Tender	$47.91	7B	1M	8Z	View
Benton	Laborers	Cement Handler	$47.62	7B	1M	8Z	View
Benton	Laborers	Chain Saw Operator & Faller	$48.20	7B	1M	8Z	View
Benton	Laborers	Clean-up Laborer	$47.62	7B	1M	8Z	View
Benton	Laborers	Compaction Equipment	$47.91	7B	1M	8Z	View
Benton	Laborers	Concrete Crewman	$47.62	7B	1M	8Z	View
Benton	Laborers	Concrete Saw, Walking	$47.91	7B	1M	8Z	View
Benton	Laborers	Concrete Signalman	$47.62	7B	1M	8Z	View
Benton	Laborers	Concrete Stack	$48.20	7B	1M	8Z	View
Benton	Laborers	Confined Space Attendant	$47.62	7B	1M	8Z	View
Benton	Laborers	Construction Specialist	$48.39	7B	1M	8Z	View
Benton	Laborers	Crusher Feeder	$47.62	7B	1M	8Z	View
Benton	Laborers	Demolition	$47.62	7B	1M	8Z	View
Benton	Laborers	Demolition Torch	$47.91	7B	1M	8Z	View
Benton	Laborers	Dope Pot Fireman, Non-mechanical	$47.91	7B	1M	8Z	View
Benton	Laborers	Driller Helper (when Required To Move & Position Machine)	$47.91	7B	1M	8Z	View
Benton	Laborers	Drills With Dual Masts	$48.50	7B	1M	8Z	View
Benton	Laborers	Dry Stack Walls	$47.62	7B	1M	8Z	View
Benton	Laborers	Dumpman	$47.62	7B	1M	8Z	View
Benton	Laborers	Erosion Control Laborer	$47.62	7B	1M	8Z	View

Benton	Laborers	Firewatch	$47.62	7B	1M	8Z	View
Benton	Laborers	Form Cleaning Machine Feeder, Stacker	$47.62	7B	1M	8Z	View
Benton	Laborers	Form Setter, Paving	$47.91	7B	1M	8Z	View
Benton	Laborers	General Laborer	$47.62	7B	1M	8Z	View
Benton	Laborers	Grade Checker	$50.33	7B	1M	8Z	View
Benton	Laborers	Grout Machine Header Tender	$47.62	7B	1M	8Z	View
Benton	Laborers	Guard Rail	$47.62	7B	1M	8Z	View
Benton	Laborers	Gunite	$48.20	7B	1M	8Z	View
Benton	Laborers	Hazardous Waste Worker (level A)	$48.50	7B	1M	8Z	View
Benton	Laborers	Hazardous Waste Worker (level B)	$48.20	7B	1M	8Z	View
Benton	Laborers	Hazardous Waste Worker (level C)	$47.91	7B	1M	8Z	View
Benton	Laborers	Hazardous Waste Worker (level D)	$47.62	7B	1M	8Z	View
Benton	Laborers	Hdpe Or Similar Liner Installer	$47.62	7B	1M	8Z	View
Benton	Laborers	High Scaler	$48.20	7B	1M	8Z	View
Benton	Laborers	Industrial Technician	$61.41	7B	1M	8Z	View
Benton	Laborers	Jackhammer Operator Miner, Class "b"	$47.91	7B	1M	8Z	View
Benton	Laborers	Laser Beam Operator	$48.20	7B	1M	8Z	View
Benton	Laborers	Miner, Class "a"	$47.62	7B	1M	8Z	View
Benton	Laborers	Miner, Class "c"	$48.20	7B	1M	8Z	View
Benton	Laborers	Miner, Class "d"	$48.50	7B	1M	8Z	View
Benton	Laborers	Monitor Operator, Air Track Or Similar Mounting	$48.20	7B	1M	8Z	View
Benton	Laborers	Mortar Mixer	$48.20	7B	1M	8Z	View
Benton	Laborers	Nipper	$47.62	7B	1M	8Z	View
Benton	Laborers	Nozzleman	$48.20	7B	1M	8Z	View
Benton	Laborers	Nozzleman, Water (to Include Fire Hose), Air Or Steam	$47.91	7B	1M	8Z	View
Benton	Laborers	Pavement Breaker, 90 Lbs. & Over	$48.20	7B	1M	8Z	View
Benton	Laborers	Pavement Breaker, Under 90 Lbs.	$47.91	7B	1M	8Z	View
Benton	Laborers	Pilot Car	$44.88	7B	1M	8Z	View
Benton	Laborers	Pipelayer	$48.20	7B	1M	8Z	View
Benton	Laborers	Pipelayer, Corrugated Metal Culvert And Multi-plate.	$47.91	7B	1M	8Z	View
Benton	Laborers	Pipewrapper	$48.20	7B	1M	8Z	View
Benton	Laborers	Plasterer Tenders	$48.20	7B	1M	8Z	View
Benton	Laborers	Pot Tender	$47.91	7B	1M	8Z	View
Benton	Laborers	Powderman	$49.97	7B	1M	8Z	View
Benton	Laborers	Powederman Helper	$47.91	7B	1M	8Z	View
Benton	Laborers	Power Buggy Operator	$47.91	7B	1M	8Z	View
Benton	Laborers	Power Tool Operator, Gas, Electric, Pneumatic	$47.91	7B	1M	8Z	View

Benton	Laborers	Rad-Con Technician	$61.41	7B	1M	8Z	View
Benton	Laborers	Railroad Equipment, Power Driven, Except Dual Mobile	$47.91	7B	1M	8Z	View
Benton	Laborers	Railroad Power Spiker Or Puller, Dual Mobile	$47.91	7B	1M	8Z	View
Benton	Laborers	Remote Equipment Operator	$48.50	7B	1M	8Z	View
Benton	Laborers	Remote Equipment Operator (i.e Compaction And Demolition)	$47.91	7B	1M	8Z	View
Benton	Laborers	Rigger/signal Person	$47.91	7B	1M	8Z	View
Benton	Laborers	Riprap Person	$47.62	7B	1M	8Z	View
Benton	Laborers	Rodder & Spreader	$47.91	7B	1M	8Z	View
Benton	Laborers	Sand Hogs Under Compressed Air Conditions	$95.15	7B	1M	8Z	View
Benton	Laborers	Sandblast Tailhoseman	$47.62	7B	1M	8Z	View
Benton	Laborers	Scaffold Erector, Wood Or Steel	$47.62	7B	1M	8Z	View
Benton	Laborers	Scaleman	$44.88	7B	1M	8Z	View
Benton	Laborers	Stake Jumper	$47.62	7B	1M	8Z	View
Benton	Laborers	Structural Mover	$47.62	7B	1M	8Z	View
Benton	Laborers	Tailhoseman (water Nozzle)	$47.62	7B	1M	8Z	View
Benton	Laborers	Timber Bucker & Faller (by Hand)	$47.62	7B	1M	8Z	View
Benton	Laborers	Track Laborer (rr)	$47.62	7B	1M	8Z	View
Benton	Laborers	Traffic Control Laborer	$44.88	7B	1M	8Z	View
Benton	Laborers	Traffic Control Supervisor	$47.62	7B	1M	8Z	View
Benton	Laborers	Trencher, Shawnee	$47.91	7B	1M	8Z	View
Benton	Laborers	Trenchless Technology Technician	$48.20	7B	1M	8Z	View
Benton	Laborers	Truck Loader	$47.62	7B	1M	8Z	View
Benton	Laborers	Truck Mounted Attenuator	$44.88	7B	1M	8Z	View
Benton	Laborers	Tugger Operator	$47.91	7B	1M	8Z	View
Benton	Laborers	Vibrators, All	$48.20	7B	1M	8Z	View
Benton	Laborers	Wagon Drills	$47.91	7B	1M	8Z	View
Benton	Laborers	Water Pipe Liner	$47.91	7B	1M	8Z	View
Benton	Laborers	Welder, Electrical, Manual Or Automatic (hdpe Or Similar Pipe And Liner)	$48.50	7B	1M	8Z	View
Benton	Laborers	Well-point Person	$47.62	7B	1M	8Z	View
Benton	Laborers	Wheelbarrow, Power Driven	$47.91	7B	1M	8Z	View
Benton	Laborers	Window Washer, Cleaner	$44.88	7B	1M	8Z	View
Benton	Laborers - Underground Sewer & Water	General Laborer & Topman	$48.20	7B	1M	8Z	View
Benton	Laborers - Underground Sewer & Water	Pipe Layer	$48.20	7B	1M	8Z	View
Benton	Landscape Construction	Landscape Laborer	$44.88	7B	1M	8Z	View
Benton	Landscape Construction	Landscape Operator	$55.13	7Z	4S	9A	View
Benton	Landscape Maintenance	Groundskeeper	$14.49		1		View
Benton	Lathers	Journey Level	$53.36	7E	4X	8N	View

Benton	Marble Setters	Journey Level	$55.44	5A	1M		View
Benton	Metal Fabrication (In Shop)	Machine Operator	$14.49		1		View
Benton	Metal Fabrication (In Shop)	Painter	$14.49		1		View
Benton	Metal Fabrication (In Shop)	Welder	$16.70		1		View
Benton	Millwright	Journey Level	$73.35	5A	1B		View
Benton	Modular Buildings	Journey Level	$14.49		1		View
Benton	Painters	Commercial Painter	$43.01	6Z	1W		View
Benton	Painters	Industrial Painter	$50.32	6Z	1W	9D	View
Benton	Pile Driver	Journey Level	$57.36	7E	4X	8N	View
Benton	Plasterers	Journey Level	$53.51	7K	1N		View
Benton	Playground & Park Equipment Installers	Journey Level	$14.49		1		View
Benton	Plumbers & Pipefitters	Journey Level	$88.41	6Z	1Q		View
Benton	Power Equipment Operators	A-frame Truck (2 Or More Drums)	$54.96	7Z	4S	9A	View
Benton	Power Equipment Operators	A-frame Truck (single Drum)	$54.30	7Z	4S	9A	View
Benton	Power Equipment Operators	All Tower Cranes	$59.25	7Z	4S	9A	View
Benton	Power Equipment Operators	Asphalt Plant Operator	$55.61	7Z	4S	9A	View
Benton	Power Equipment Operators	Assistant Plant Operator, Fireman Or Pugmixer (asphalt)	$54.30	7Z	4S	9A	View
Benton	Power Equipment Operators	Assistant Refrigeration Plant & Chiller Operator (over 1000 Ton)	$54.96	7Z	4S	9A	View
Benton	Power Equipment Operators	Assistant Refrigeration Plant (under 1000 Ton)	$54.30	7Z	4S	9A	View
Benton	Power Equipment Operators	Automatic Subgrader (ditches & Trimmers)	$55.61	7Z	4S	9A	View
Benton	Power Equipment Operators	Backfillers (cleveland & Similar)	$54.96	7Z	4S	9A	View
Benton	Power Equipment Operators	Backhoe & Hoe Ram (under 3/4 Yd.)	$55.31	7Z	4S	9A	View
Benton	Power Equipment Operators	Backhoe (45,000 Gw & Under)	$55.31	7Z	4S	9A	View
Benton	Power Equipment Operators	Backhoe (45,000 Gw To 110,000 Gw)	$55.61	7Z	4S	9A	View
Benton	Power Equipment Operators	Backhoe (over 110,000 Gw)	$55.90	7Z	4S	9A	View
Benton	Power Equipment Operators	Backhoes & Hoe Ram (3 Yds & Over)	$55.90	7Z	4S	9A	View
Benton	Power Equipment Operators	Backhoes & Hoe Ram (3/4 Yd. To 3 Yd.)	$55.61	7Z	4S	9A	View
Benton	Power Equipment Operators	Bagley Or Stationary Scraper	$54.30	7Z	4S	9A	View
Benton	Power Equipment Operators	Batch & Wet Mix Operator (multiple Units, 2 & Incl. 4)	$55.61	7Z	4S	9A	View
Benton	Power Equipment Operators	Batch Plant & Wet Mix Operator, Single Unit (concrete)	$54.96	7Z	4S	9A	View
Benton	Power Equipment Operators	Batch Plant (over 4 Units)	$55.61	7Z	4S	9A	View
Benton	Power Equipment Operators	Belt Finishing Machine	$54.30	7Z	4S	9A	View
Benton	Power Equipment Operators	Belt Loader (kocal Or Similar)	$54.96	7Z	4S	9A	View
Benton	Power Equipment Operators	Belt-crete Conveyors With Power Pack Or Similar	$54.96	7Z	4S	9A	View

Benton	Power Equipment Operators	Bending Machine	$54.96	7Z	4S	9A	View
Benton	Power Equipment Operators	Bit Grinders	$53.96	7Z	4S	9A	View
Benton	Power Equipment Operators	Blade (finish & Bluetop), Automatic, Cmi, Abc, Finish Athey & Huber & Similar When Used As Automatic	$55.90	7Z	4S	9A	View
Benton	Power Equipment Operators	Blade Operator (motor Patrol & Attachments)	$55.61	7Z	4S	9A	View
Benton	Power Equipment Operators	Blower Operator (cement)	$54.30	7Z	4S	9A	View
Benton	Power Equipment Operators	Boat Operator	$53.96	7Z	4S	9A	View
Benton	Power Equipment Operators	Bob Cat (skid Steer)	$54.96	7Z	4S	9A	View
Benton	Power Equipment Operators	Bolt Threading Machine	$53.96	7Z	4S	9A	View
Benton	Power Equipment Operators	Boom Cats (side)	$55.61	7Z	4S	9A	View
Benton	Power Equipment Operators	Boring Machine (earth)	$54.96	7Z	4S	9A	View
Benton	Power Equipment Operators	Boring Machine (Rock Under 8 inch Bit - Quarry Master, Joy Or Similar)	$54.96	7Z	4S	9A	View
Benton	Power Equipment Operators	Bump Cutter (wayne, Saginau Or Similar)	$54.96	7Z	4S	9A	View
Benton	Power Equipment Operators	Cableway Controller (dispatcher)	$55.61	7Z	4S	9A	View
Benton	Power Equipment Operators	Cableway Operators	$55.90	7Z	4S	9A	View
Benton	Power Equipment Operators	Canal Lining Machine (concrete)	$54.96	7Z	4S	9A	View
Benton	Power Equipment Operators	Carrydeck & Boom Truck (under 25 Tons)	$55.31	7Z	4S	9A	View
Benton	Power Equipment Operators	Cement Hog	$54.30	7Z	4S	9A	View
Benton	Power Equipment Operators	Chipper (without Crane) Cleaning & Doping Machine (pipeline)	$54.96	7Z	4S	9A	View
Benton	Power Equipment Operators	Clamshell, Dragline	$57.63	7Z	4S	9A	View
Benton	Power Equipment Operators	Compactor (self-propelled With Blade)	$55.61	7Z	4S	9A	View
Benton	Power Equipment Operators	Compressor (2000 Cfm Or Over, 2 Or More, Gas Diesel Or Electric Power)	$54.30	7Z	4S	9A	View
Benton	Power Equipment Operators	Compressors (under 2000 Cfm, Gas, Diesel Or Electric Power)	$53.96	7Z	4S	9A	View
Benton	Power Equipment Operators	Concrete Cleaning / Decontamination Machine Operator	$55.90	7Z	4S	9A	View
Benton	Power Equipment Operators	Concrete Pump Boon Truck	$55.61	7Z	4S	9A	View
Benton	Power Equipment Operators	Concrete Pumps (squeeze-crete, Flow-crete, Whitman & Similar)	$55.13	7Z	4S	9A	View
Benton	Power Equipment Operators	Concrete Saw (multiple Cut)	$54.30	7Z	4S	9A	View
Benton	Power Equipment Operators	Concrete Slip Form Paver	$55.61	7Z	4S	9A	View
Benton	Power Equipment Operators	Conveyor Aggregate Delivery Systems (c.a.d.)	$55.61	7Z	4S	9A	View
Benton	Power Equipment Operators	Crane Oiler & Cable Tender, Mucking Machine	$53.96	7Z	4S	9A	View
Benton	Power Equipment Operators	Crane Oiler - Driver (cdl	$54.30	7Z	4S	9A	View

		Required)					
Benton	Power Equipment Operators	Cranes (100 to 299 Tons) All Attachments	$58.49	7Z	4S	9A	View
Benton	Power Equipment Operators	Cranes (25 Tons & Under), All Attachments Incl. Clamshell, Dragline	$55.31	7Z	4S	9A	View
Benton	Power Equipment Operators	Cranes (25 Tons To And Including 44 Tons), All Attachments Incl. Clamshell, Dragline	$55.61	7Z	4S	9A	View
Benton	Power Equipment Operators	Cranes (300 Tons and Over) All Attachments	$59.25	7Z	4S	9A	View
Benton	Power Equipment Operators	Cranes (45 Tons To 55 Tons), All Attachments Incl. Clamshell And Dragline	$55.90	7Z	4S	9A	View
Benton	Power Equipment Operators	Cranes (56 to 99 tons) and overhead, rail and Quick Tower. All attachment incl. Clamshell, Dragline	$57.63	7Z	4S	9A	View
Benton	Power Equipment Operators	Crusher Feeder	$53.96	7Z	4S	9A	View
Benton	Power Equipment Operators	Crusher, Grizzle & Screening Plant Operator	$55.61	7Z	4S	9A	View
Benton	Power Equipment Operators	Curb Extruder (asphalt Or Concrete)	$55.13	7Z	4S	9A	View
Benton	Power Equipment Operators	Deck Engineer	$54.96	7Z	4S	9A	View
Benton	Power Equipment Operators	Deck Hand	$53.96	7Z	4S	9A	View
Benton	Power Equipment Operators	Derricks & Stifflegs (65 Tons & Over)	$55.90	7Z	4S	9A	View
Benton	Power Equipment Operators	Derricks & Stifflegs (under 65 Tons)	$55.31	7Z	4S	9A	View
Benton	Power Equipment Operators	Distributor Leverman	$54.30	7Z	4S	9A	View
Benton	Power Equipment Operators	Ditch Witch Or Similar	$54.30	7Z	4S	9A	View
Benton	Power Equipment Operators	Dope Pots (power Agitated	$54.30	7Z	4S	9A	View
Benton	Power Equipment Operators	Dozer / Tractor (up To D-6 Or Equivalent) And Traxcavator	$54.96	7Z	4S	9A	View
Benton	Power Equipment Operators	Dozer / Tractors (d-6 & Equivalent & Over)	$55.61	7Z	4S	9A	View
Benton	Power Equipment Operators	Dozer, 834 R/t & Similar	$55.61	7Z	4S	9A	View
Benton	Power Equipment Operators	Drill Doctor	$55.61	7Z	4S	9A	View
Benton	Power Equipment Operators	Driller Licensed	$57.63	7Z	4S	9A	View
Benton	Power Equipment Operators	Drillers Helper	$53.96	7Z	4S	9A	View
Benton	Power Equipment Operators	Drilling Equipment (8 inch Bit & Over - Robbins, Reverse Circulation & Similar)	$55.31	7Z	4S	9A	View
Benton	Power Equipment Operators	Drills (churn, Core, Calyx Or Diamond)	$55.13	7Z	4S	9A	View
Benton	Power Equipment Operators	Elevating Belt (holland Type)	$55.90	7Z	4S	9A	View
Benton	Power Equipment Operators	Elevating Belt-type Loader (euclid, Barber Green & Similar)	$54.96	7Z	4S	9A	View
Benton	Power Equipment Operators	Elevating Grader-type Loader (dumor, Adams Or Similar)	$54.96	7Z	4S	9A	View

Benton	Power Equipment Operators	Elevator Hoisting Materials	$54.30	7Z	4S	9A	View
Benton	Power Equipment Operators	Equipment Serviceman, Greaser & Oiler	$55.13	7Z	4S	9A	View
Benton	Power Equipment Operators	Fireman & Heater Tender	$53.96	7Z	4S	9A	View
Benton	Power Equipment Operators	Fork Lift Or Lumber Stacker, Hydra-life & Similar	$54.30	7Z	4S	9A	View
Benton	Power Equipment Operators	Generator Plant Engineers (diesel Or Electric)	$54.96	7Z	4S	9A	View
Benton	Power Equipment Operators	Gin Trucks (pipeline)	$54.30	7Z	4S	9A	View
Benton	Power Equipment Operators	Grade Checker	$55.31	7Z	4S	9A	View
Benton	Power Equipment Operators	Gunite Combination Mixer & Compressor	$54.96	7Z	4S	9A	View
Benton	Power Equipment Operators	H.d. Mechanic	$55.90	7Z	4S	9A	View
Benton	Power Equipment Operators	H.d. Welder	$55.90	7Z	4S	9A	View
Benton	Power Equipment Operators	Heavy Equipment Robotics Operator	$55.90	7Z	4S	9A	View
Benton	Power Equipment Operators	Helicopter Pilot	$57.63	7Z	4S	9A	View
Benton	Power Equipment Operators	Helper, Mechanic Or Welder, H.D	$53.96	7Z	4S	9A	View
Benton	Power Equipment Operators	Hoe Ram	$55.31	7Z	4S	9A	View
Benton	Power Equipment Operators	Hoist (2 Or More Drums Or Tower Hoist)	$55.13	7Z	4S	9A	View
Benton	Power Equipment Operators	Hoist, Single Drum	$54.30	7Z	4S	9A	View
Benton	Power Equipment Operators	Hydraulic Platform Trailers (goldhofer, Shaurerly And Similar)	$55.90	7Z	4S	9A	View
Benton	Power Equipment Operators	Hydro-seeder, Mulcher, Nozzleman	$53.96	7Z	4S	9A	View
Benton	Power Equipment Operators	Lime Batch Tank Operator (recycle Train)	$55.61	7Z	4S	9A	View
Benton	Power Equipment Operators	Lime Brain Operator (recycle Train)	$55.61	7Z	4S	9A	View
Benton	Power Equipment Operators	Loader (360 Degrees Revolving Koehring Scooper Or Similar)	$55.90	7Z	4S	9A	View
Benton	Power Equipment Operators	Loader Operator (front-end & Overhead, 4 Yds. Incl. 8 Yds.)	$55.61	7Z	4S	9A	View
Benton	Power Equipment Operators	Loaders (bucket Elevators And Conveyors)	$54.30	7Z	4S	9A	View
Benton	Power Equipment Operators	Loaders (overhead & Front-end, Over 8 Yds.)	$55.90	7Z	4S	9A	View
Benton	Power Equipment Operators	Loaders (overhead & Front-end, Under 4 Yds.. R/t)	$55.13	7Z	4S	9A	View
Benton	Power Equipment Operators	Loaders (overhead And Front-end, 10 Yds. & Over)	$57.63	7Z	4S	9A	View
Benton	Power Equipment Operators	Locomotive Engineer	$54.96	7Z	4S	9A	View
Benton	Power Equipment Operators	Longitudinal Float	$54.30	7Z	4S	9A	View
Benton	Power Equipment Operators	Master Environmental Maintenance Technician	$55.90	7Z	4S	9A	View
Benton	Power Equipment Operators	Mixer (portable - Concrete)	$54.30	7Z	4S	9A	View
Benton	Power Equipment Operators	Mixermobile	$54.96	7Z	4S	9A	View
Benton	Power Equipment Operators	Mobile Crusher Operator	$55.61	7Z	4S	9A	View

		(recycle Train)					
Benton	Power Equipment Operators	Mucking Machine	$54.96	7Z	4S	9A	View
Benton	Power Equipment Operators	Multiple Dozer Units With Single Blade	$55.61	7Z	4S	9A	View
Benton	Power Equipment Operators	Pavement Breaker, Hydra-hammer & Similar	$54.30	7Z	4S	9A	View
Benton	Power Equipment Operators	Paving (dual Drum)	$55.31	7Z	4S	9A	View
Benton	Power Equipment Operators	Paving Machine (asphalt And Concrete)	$55.61	7Z	4S	9A	View
Benton	Power Equipment Operators	Piledriving Engineers	$55.31	7Z	4S	9A	View
Benton	Power Equipment Operators	Plant Oiler	$53.96	7Z	4S	9A	View
Benton	Power Equipment Operators	Posthole Auger Or Punch	$54.96	7Z	4S	9A	View
Benton	Power Equipment Operators	Power Broom	$54.30	7Z	4S	9A	View
Benton	Power Equipment Operators	Pump (grout Or Jet)	$54.96	7Z	4S	9A	View
Benton	Power Equipment Operators	Pumpman	$53.96	7Z	4S	9A	View
Benton	Power Equipment Operators	Quad-track Or Similar Equipment	$55.61	7Z	4S	9A	View
Benton	Power Equipment Operators	Railroad Ballast Regulation Operator (self-propelled)	$54.30	7Z	4S	9A	View
Benton	Power Equipment Operators	Railroad Power Tamper Operator (self-propelled)	$54.30	7Z	4S	9A	View
Benton	Power Equipment Operators	Railroad Tamper Jack Operator (self-propelled)	$54.30	7Z	4S	9A	View
Benton	Power Equipment Operators	Railroad Track Liner Operator (self-propelled)	$55.31	7Z	4S	9A	View
Benton	Power Equipment Operators	Refrigeration Plant Engineer (1000 Tons & Over)	$55.31	7Z	4S	9A	View
Benton	Power Equipment Operators	Refrigeration Plant Engineer (under 1000 Ton)	$55.13	7Z	4S	9A	View
Benton	Power Equipment Operators	Rollerman (finishing Asphalt Pavement)	$55.61	7Z	4S	9A	View
Benton	Power Equipment Operators	Rollers, All Types On Subgrade, Including Seal And Chip Coating (farm Type, Case, John Deere And Similar,or Compacting Vibrator), Except When Pulled B	$53.96	7Z	4S	9A	View
Benton	Power Equipment Operators	Roto Mill (pavement Grinder)	$55.61	7Z	4S	9A	View
Benton	Power Equipment Operators	Rotomill Groundsman	$55.13	7Z	4S	9A	View
Benton	Power Equipment Operators	Rubber-tired Scrapers (multiple Engine With Three Or More Scrapers)	$55.90	7Z	4S	9A	View
Benton	Power Equipment Operators	Rubber-tired Skidders (r/t With Or Without Attachments)	$55.13	7Z	4S	9A	View
Benton	Power Equipment Operators	Scrapers, All, Rubber-tired	$55.61	7Z	4S	9A	View
Benton	Power Equipment Operators	Screed Operator	$55.61	7Z	4S	9A	View
Benton	Power Equipment Operators	Shovels (3 Yds. & Over)	$55.90	7Z	4S	9A	View
Benton	Power Equipment Operators	Shovels (under 3 Yds.)	$55.61	7Z	4S	9A	View
Benton	Power Equipment Operators	Signalman (whirleys, Highline, Hammerheads Or Similar)	$55.31	7Z	4S	9A	View
Benton	Power Equipment Operators	Soil Stabilizer (p & H Or	$54.96	7Z	4S	9A	View

		Similar)					
Benton	Power Equipment Operators	Spray Curing Machine (concrete)	$54.30	7Z	4S	9A	View
Benton	Power Equipment Operators	Spreader Box (self-propelled)	$54.30	7Z	4S	9A	View
Benton	Power Equipment Operators	Spreader Machine	$54.96	7Z	4S	9A	View
Benton	Power Equipment Operators	Steam Cleaner	$53.96	7Z	4S	9A	View
Benton	Power Equipment Operators	Straddle Buggy (ross & Similar On Construction Job Only)	$54.30	7Z	4S	9A	View
Benton	Power Equipment Operators	Surface Heater & Planer Machine	$55.13	7Z	4S	9A	View
Benton	Power Equipment Operators	Tractor (farm Type R/t With Attachments, Except Backhoe)	$54.30	7Z	4S	9A	View
Benton	Power Equipment Operators	Traverse Finish Machine	$54.96	7Z	4S	9A	View
Benton	Power Equipment Operators	Trenching Machines (7 Ft. Depth & Over)	$55.61	7Z	4S	9A	View
Benton	Power Equipment Operators	Trenching Machines (under 7 Ft. Depth Capacity)	$55.13	7Z	4S	9A	View
Benton	Power Equipment Operators	Tug Boat Operator	$55.61	7Z	4S	9A	View
Benton	Power Equipment Operators	Tugger Operator	$54.30	7Z	4S	9A	View
Benton	Power Equipment Operators	Turnhead (with Re-screening)	$55.13	7Z	4S	9A	View
Benton	Power Equipment Operators	Turnhead Operator	$54.96	7Z	4S	9A	View
Benton	Power Equipment Operators	Ultra High Pressure Wateriet Cutting Tool System Operator, (30,000 Psi)	$55.90	7Z	4S	9A	View
Benton	Power Equipment Operators	Vactor Guzzler, Super Sucker	$55.61	7Z	4S	9A	View
Benton	Power Equipment Operators	Vacuum Blasting Machine Operator	$55.90	7Z	4S	9A	View
Benton	Power Equipment Operators	Vacuum Drill (reverse Circulation Drill Under 8 Inch Bit)	$55.13	7Z	4S	9A	View
Benton	Power Equipment Operators	Welding Machine	$53.96	7Z	4S	9A	View
Benton	Power Equipment Operators	Whirleys & Hammerheads, All	$55.90	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	A-frame Truck (2 Or More Drums)	$54.96	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	A-frame Truck (single Drum)	$54.30	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	All Tower Cranes	$59.25	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Asphalt Plant Operator	$55.61	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Assistant Plant Operator, Fireman Or Pugmixer (asphalt)	$54.30	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Assistant Refrigeration Plant & Chiller Operator (over 1000 Ton)	$54.96	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Assistant Refrigeration Plant (under 1000 Ton)	$54.30	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Automatic Subgrader (ditches & Trimmers)	$55.61	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Backfillers (cleveland & Similar)	$54.96	7Z	4S	9A	View

Benton	Power Equipment Operators-Underground Sewer & Water	Backhoe & Hoe Ram (under 3/4 Yd.)	$55.31	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Backhoe (45,000 Gw & Under)	$55.31	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Backhoe (45,000 Gw To 110,000 Gw)	$55.61	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Backhoe (over 110,000 Gw)	$55.90	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Backhoes & Hoe Ram (3 Yds & Over)	$55.90	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Backhoes & Hoe Ram (3/4 Yd. To 3 Yd.)	$55.61	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Bagley Or Stationary Scraper	$54.30	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Batch & Wet Mix Operator (multiple Units, 2 & Incl. 4)	$55.61	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Batch Plant & Wet Mix Operator, Single Unit (concrete)	$54.96	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Batch Plant (over 4 Units)	$55.61	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Belt Finishing Machine	$54.30	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Belt Loader (kocal Or Similar)	$54.96	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Belt-crete Conveyors With Power Pack Or Similar	$54.96	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Bending Machine	$54.96	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Bit Grinders	$53.96	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Blade (finish & Bluetop), Automatic, Cmi, Abc, Finish Athey & Huber & Similar When Used As Automatic	$55.90	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Blade Operator (motor Patrol & Attachments)	$55.61	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Blower Operator (cement)	$54.30	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Boat Operator	$53.96	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Bob Cat (skid Steer)	$54.96	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Bolt Threading Machine	$53.96	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Boom Cats (side)	$55.61	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Boring Machine (earth)	$54.96	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Boring Machine (Rock Under 8 inch Bit - Quarry Master, Joy Or Similar)	$54.96	7Z	4S	9A	View
Benton	Power Equipment Operators-	Bump Cutter (wayne, Saginau	$54.96	7Z	4S	9A	View

	Underground Sewer & Water	Or Similar)					
Benton	Power Equipment Operators-Underground Sewer & Water	Cableway Controller (dispatcher)	$55.61	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Cableway Operators	$55.90	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Canal Lining Machine (concrete)	$54.96	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Carrydeck & Boom Truck (under 25 Tons)	$55.31	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Cement Hog	$54.30	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Chipper (without Crane) Cleaning & Doping Machine (pipeline)	$54.96	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Clamshell, Dragline	$57.63	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Compactor (self-propelled With Blade)	$55.61	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Compressor (2000 Cfm Or Over, 2 Or More, Gas Diesel Or Electric Power)	$54.30	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Compressors (under 2000 Cfm, Gas, Diesel Or Electric Power)	$53.96	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Concrete Cleaning / Decontamination Machine Operator	$55.90	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Concrete Pump Boon Truck	$55.61	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Concrete Pumps (squeeze-crete, Flow-crete, Whitman & Similar)	$55.13	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Concrete Saw (multiple Cut)	$54.30	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Concrete Slip Form Paver	$55.61	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Conveyor Aggregate Delivery Systems (c.a.d.)	$55.61	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Crane Oiler & Cable Tender, Mucking Machine	$53.96	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Crane Oiler - Driver (cdl Required)	$54.30	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Cranes (100 to 299 Tons) All Attachments	$58.49	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Cranes (25 Tons & Under), All Attachments Incl. Clamshell, Dragline	$55.31	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Cranes (25 Tons To And Including 44 Tons), All Attachments Incl. Clamshell, Dragline	$55.61	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Cranes (300 Tons and Over) All Attachments	$59.25	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Cranes (45 Tons To 55 Tons), All Attachments Incl.	$55.90	7Z	4S	9A	View

		Clamshell And Dragline					
Benton	Power Equipment Operators-Underground Sewer & Water	Cranes (56 to 99 tons) and overhead, rail and Quick Tower. All attachment incl. Clamshell, Dragline	$57.63	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Crusher Feeder	$53.96	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Crusher, Grizzle & Screening Plant Operator	$55.61	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Curb Extruder (asphalt Or Concrete)	$55.13	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Deck Engineer	$54.96	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Deck Hand	$53.96	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Derricks & Stifflegs (65 Tons & Over)	$55.90	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Derricks & Stifflegs (under 65 Tons)	$55.31	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Distributor Leverman	$54.30	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Ditch Witch Or Similar	$54.30	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Dope Pots (power Agitated	$54.30	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Dozer / Tractor (up To D-6 Or Equivalent) And Traxcavator	$54.96	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Dozer / Tractors (d-6 & Equivalent & Over)	$55.61	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Dozer, 834 R/t & Similar	$55.61	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Drill Doctor	$55.61	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Driller Licensed	$57.63	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Drillers Helper	$53.96	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Drilling Equipment (8 inch Bit & Over - Robbins, Reverse Circulation & Similar)	$55.31	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Drills (churn, Core, Calyx Or Diamond)	$55.13	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Elevating Belt (holland Type)	$55.90	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Elevating Belt-type Loader (euclid, Barber Green & Similar)	$54.96	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Elevating Grader-type Loader (dumor, Adams Or Similar)	$54.96	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Elevator Hoisting Materials	$54.30	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Equipment Serviceman, Greaser & Oiler	$55.13	7Z	4S	9A	View

Benton	Power Equipment Operators-Underground Sewer & Water	Fireman & Heater Tender	$53.96	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Fork Lift Or Lumber Stacker, Hydra-life & Similar	$54.30	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Generator Plant Engineers (diesel Or Electric)	$54.96	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Gin Trucks (pipeline)	$54.30	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Grade Checker	$55.31	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Gunite Combination Mixer & Compressor	$54.96	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	H.d. Mechanic	$55.90	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	H.d. Welder	$55.90	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Heavy Equipment Robotics Operator	$55.90	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Helicopter Pilot	$57.63	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Helper, Mechanic Or Welder, H.D	$53.96	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Hoe Ram	$55.31	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Hoist (2 Or More Drums Or Tower Hoist)	$55.13	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Hoist, Single Drum	$54.30	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Hydraulic Platform Trailers (goldhofer, Shaurerly And Similar)	$55.90	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Hydro-seeder, Mulcher, Nozzleman	$53.96	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Lime Batch Tank Operator (recycle Train)	$55.61	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Lime Brain Operator (recycle Train)	$55.61	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Loader (360 Degrees Revolving Koehring Scooper Or Similar)	$55.90	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Loader Operator (front-end & Overhead, 4 Yds. Incl. 8 Yds.)	$55.61	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Loaders (bucket Elevators And Conveyors)	$54.30	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Loaders (overhead & Front-end, Over 8 Yds.)	$55.90	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Loaders (overhead & Front-end, Under 4 Yds.. R/t)	$55.13	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Locomotive Engineer	$54.96	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Longitudinal Float	$54.30	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Master Environmental Maintenance Technician	$55.90	7Z	4S	9A	View

Benton	Power Equipment Operators-Underground Sewer & Water	Mixer (portable - Concrete)	$54.30	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Mixermobile	$54.96	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Mobile Crusher Operator (recycle Train)	$55.61	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Mucking Machine	$54.96	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Multiple Dozer Units With Single Blade	$55.61	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Pavement Breaker, Hydra-hammer & Similar	$54.30	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Paving (dual Drum)	$55.31	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Paving Machine (asphalt And Concrete)	$55.61	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Piledriving Engineers	$55.31	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Plant Oiler	$53.96	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Posthole Auger Or Punch	$54.96	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Power Broom	$54.30	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Pump (grout Or Jet)	$54.96	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Pumpman	$53.96	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Quad-track Or Similar Equipment	$55.61	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Railroad Ballast Regulation Operator (self-propelled)	$54.30	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Railroad Power Tamper Operator (self-propelled)	$54.30	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Railroad Tamper Jack Operator (self-propelled)	$54.30	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Railroad Track Liner Operator (self-propelled)	$55.31	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Refrigeration Plant Engineer (1000 Tons & Over)	$55.31	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Refrigeration Plant Engineer (under 1000 Ton)	$55.13	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Rollerman (finishing Asphalt Pavement)	$55.61	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Rollers, All Types On Subgrade, Including Seal And Chip Coating (farm Type, Case, John Deere And Similar,or Compacting Vibrator), Except When Pulled B	$53.96	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Roto Mill (pavement Grinder)	$55.61	7Z	4S	9A	View
Benton	Power Equipment Operators-	Rotomill Groundsman	$55.13	7Z	4S	9A	View

	Underground Sewer & Water						
Benton	Power Equipment Operators-Underground Sewer & Water	Rubber-tired Scrapers (multiple Engine With Three Or More Scrapers)	$55.90	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Rubber-tired Skidders (r/t With Or Without Attachments)	$55.13	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Scrapers, All, Rubber-tired	$55.61	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Screed Operator	$55.61	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Shovels (3 Yds. & Over)	$55.90	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Shovels (under 3 Yds.)	$55.61	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Signalman (whirleys, Highline, Hammerheads Or Similar)	$55.31	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Soil Stabilizer (p & H Or Similar)	$54.96	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Spray Curing Machine (concrete)	$54.30	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Spreader Box (self-propelled)	$54.30	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Spreader Machine	$54.96	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Steam Cleaner	$53.96	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Straddle Buggy (ross & Similar On Construction Job Only)	$54.30	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Surface Heater & Planer Machine	$55.13	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Tractor (farm Type R/t With Attachments, Except Backhoe)	$54.30	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Traverse Finish Machine	$54.96	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Trenching Machines (7 Ft. Depth & Over)	$55.61	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Trenching Machines (under 7 Ft. Depth Capacity)	$55.13	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Tug Boat Operator	$55.61	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Tugger Operator	$54.30	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Turnhead (with Re-screening)	$55.13	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Turnhead Operator	$54.96	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Ultra High Pressure Wateriet Cutting Tool System Operator, (30,000 Psi)	$55.90	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Vactor Guzzler, Super Sucker	$55.61	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Vacuum Blasting Machine Operator	$55.90	7Z	4S	9A	View

Benton	Power Equipment Operators-Underground Sewer & Water	Vacuum Drill (reverse Circulation Drill Under 8 Inch Bit)	$55.13	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Welding Machine	$53.96	7Z	4S	9A	View
Benton	Power Equipment Operators-Underground Sewer & Water	Whirleys & Hammerheads, All	$55.90	7Z	4S	9A	View
Benton	Power Line Clearance Tree Trimmers	Journey Level In Charge	$57.22	5A	4A		View
Benton	Power Line Clearance Tree Trimmers	Spray Person	$54.32	5A	4A		View
Benton	Power Line Clearance Tree Trimmers	Tree Equipment Operator	$57.22	5A	4A		View
Benton	Power Line Clearance Tree Trimmers	Tree Trimmer	$51.18	5A	4A		View
Benton	Power Line Clearance Tree Trimmers	Tree Trimmer Groundperson	$38.99	5A	4A		View
Benton	Refrigeration & Air Conditioning Mechanics	Journey Level	$88.41	6Z	1Q		View
Benton	Residential Brick Mason	Journey Level	$55.44	5A	1M		View
Benton	Residential Carpenters	Journey Level	$22.73		1		View
Benton	Residential Cement Masons	Journey Level	$52.83	7B	1N		View
Benton	Residential Drywall Applicators	Journey Level	$26.40		1		View
Benton	Residential Drywall Tapers	Journey Level	$42.98		1		View
Benton	Residential Electricians	Journey Level	$37.11	5A	11F		View
Benton	Residential Glaziers	Journey Level	$15.06		1		View
Benton	Residential Insulation Applicators	Journey Level	$20.50		1		View
Benton	Residential Laborers	Journey Level	$22.73		1		View
Benton	Residential Marble Setters	Journey Level	$55.44	5A	1M		View
Benton	Residential Painters	Journey Level	$19.86		1		View
Benton	Residential Plumbers & Pipefitters	Journey Level	$28.62		1		View
Benton	Residential Refrigeration & Air Conditioning Mechanics	Journey Level	$19.00		1		View
Benton	Residential Sheet Metal Workers	Journey Level (Field or Shop)	$52.13	5A	1X		View
Benton	Residential Soft Floor Layers	Journey Level	$23.11	5A	1N		View
Benton	Residential Sprinkler Fitters (Fire Protection)	Journey Level	$14.49		1		View
Benton	Residential Stone Masons	Journey Level	$55.44	5A	1M		View
Benton	Residential Terrazzo Workers	Journey Level	$14.86		1		View
Benton	Residential Terrazzo/Tile Finishers	Journey Level	$14.86		1		View
Benton	Residential Tile Setters	Journey Level	$19.41		1		View
Benton	Roofers	Irritable Bituminous Roofer	$47.53	7G	4I		View
Benton	Roofers	Journeyman Roofer, Waterproofer, Kettleman	$44.53	7G	4I		View
Benton	Sheet Metal Workers	Journey Level (Field or Shop)	$71.93	5A	1X		View
Benton	Sign Makers & Installers (Electrical)	Journey Level	$14.65		1		View

Benton	Sign Makers & Installers (Non-Electrical)	Journey Level	$14.65		1		View
Benton	Soft Floor Layers	Journey Level	$55.56	5A	3J		View
Benton	Solar Controls For Windows	Journey Level	$14.49		1		View
Benton	Sprinkler Fitters (Fire Protection)	Journey Level	$64.44	7J	1R		View
Benton	Stage Rigging Mechanics (Non Structural)	Journey Level	$14.49		1		View
Benton	Stone Masons	Journey Level	$55.44	5A	1M		View
Benton	Street And Parking Lot Sweeper Workers	Journey Level	$14.49		1		View
Benton	Surveyors	All Classifications	$24.27	0	1		View
Benton	Telecommunication Technicians	Journey Level	$50.82	5I	1B		View
Benton	Telephone Line Construction - Outside	Cable Splicer	$39.15	5A	2B		View
Benton	Telephone Line Construction - Outside	Hole Digger/Ground Person	$26.29	5A	2B		View
Benton	Telephone Line Construction - Outside	Telephone Equipment Operator (Light)	$32.72	5A	2B		View
Benton	Telephone Line Construction - Outside	Telephone Lineperson	$37.00	5A	2B		View
Benton	Terrazzo Workers	Journey Level	$43.81	5A	1M		View
Benton	Tile Setters	Journey Level	$43.81	5A	1M		View
Benton	Tile, Marble & Terrazzo Finishers	Journey Level	$35.93	5A	1M		View
Benton	Traffic Control Stripers	Journey Level	$51.90	7A	1K		View
Benton	Truck Drivers	Asphalt Mix Over 20 Yards	$54.60	5D	1V	8M	View
Benton	Truck Drivers	Asphalt Mix To 20 Yards	$54.40	5D	1V	8M	View
Benton	Truck Drivers	Dump Truck	$54.40	5D	1V	8M	View
Benton	Truck Drivers	Dump Truck & Trailer	$54.60	5D	1V	8M	View
Benton	Truck Drivers	Other Trucks	$54.29	5D	1V	8M	View
Benton	Truck Drivers - Ready Mix	Transit Mixers 20 yards and under	$54.60	5D	1V	8M	View
Benton	Truck Drivers - Ready Mix	Transit Mixers over 20 yards	$54.94	5D	1V	8M	View
Benton	Well Drillers & Irrigation Pump Installers	Irrigation Pump Installer	$14.49		1		View
Benton	Well Drillers & Irrigation Pump Installers	Oiler	$14.49		1		View
Benton	Well Drillers & Irrigation Pump Installers	Well Driller	$18.00		1		View

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Overtime Codes

Overtime calculations are based on the hourly rate actually paid to the worker. On public works projects, the hourly rate must be not less than the prevailing rate of wage minus the hourly rate of the cost of fringe benefits actually provided for the worker.

1. ALL HOURS WORKED IN EXCESS OF EIGHT (8) HOURS PER DAY OR FORTY (40) HOURS PER WEEK SHALL BE PAID AT ONE AND ONE-HALF TIMES THE HOURLY RATE OF WAGE.

B. All hours worked on Saturdays shall be paid at one and one-half times the hourly rate of wage. All hours worked on Sundays and holidays shall be paid at double the hourly rate of wage.

C. The first two (2) hours after eight (8) regular hours Monday through Friday and the first ten (10) hours on Saturday shall be paid at one and one-half times the hourly rate of wage. All other overtime hours and all hours worked on Sundays and holidays shall be paid at double the hourly rate of wage.

D. The first two (2) hours before or after a five-eight (8) hour workweek day or a four-ten (10) hour workweek day and the first eight (8) hours worked the next day after either workweek shall be paid at one and one-half times the hourly rate of wage. All additional hours worked and all worked on Sundays and holidays shall be paid at double the hourly rate of wage.

E. The first two (2) hours after eight (8) regular hours Monday through Friday and the first eight (8) hours on Saturday shall be paid at one and one-half times the hourly rate of wage. All other hours worked Monday through Saturday, and all hours worked on Sundays and holidays shall be paid at double the hourly rate of wage.

F. The first two (2) hours after eight (8) regular hours Monday through Friday and the first ten (10) hours on Saturday shall be paid at one and one-half times the hourly rate of wage. All other overtime hours worked, except Labor Day, shall be paid at double the hourly rate of wage. All hours worked on Labor Day shall be paid at three times the hourly rate of wage.

G. The first ten (10) hours worked on Saturdays and the first ten (10) hours worked on a fifth calendar weekday in a four-ten hour schedule, shall be paid at one and one-half times the hourly rate of wage. All hours worked in excess of ten (10) hours per day Monday through Saturday and all hours worked on Sundays and holidays shall be paid at double the hourly rate of wage.

H. All hours worked on Saturdays (except makeup days if work is lost due to inclement weather conditions or equipment breakdown) shall be paid at one and one-half times the hourly rate of wage. All hours worked Monday through Saturday over twelve (12) hours and all hours worked on Sundays and holidays shall be paid at double the hourly rate of wage.

I. All hours worked on Sundays and holidays shall also be paid at double the hourly rate of wage.

J. The first two (2) hours after eight (8) regular hours Monday through Friday and the first ten (10) hours on Saturday shall be paid at one and one-half times the hourly rate of wage. All hours worked over ten (10) hours Monday through Saturday, Sundays and holidays shall be paid at double the hourly rate of wage.

K. All hours worked on Saturdays and Sundays shall be paid at one and one-half times the hourly rate of wage. All hours worked on holidays shall be paid at double the hourly rate of wage.

M. All hours worked on Saturdays (except makeup days if work is lost due to inclement weather conditions) shall be paid at one and one-half times the hourly rate of wage. All hours worked on Sundays and holidays shall be paid at double the hourly rate of wage.

N. All hours worked on Saturdays (except makeup days) shall be paid at one and one-half times the hourly rate of wage. All hours worked on Sundays and holidays shall be paid at double the hourly rate of wage.

Overtime Codes Continued

1. O. The first ten (10) hours worked on Saturday shall be paid at one and one-half times the hourly rate of wage. All hours worked on Sundays, holidays and after twelve (12) hours, Monday through Friday and after ten (10) hours on Saturday shall be paid at double the hourly rate of wage.

P. All hours worked on Saturdays (except makeup days if circumstances warrant) and Sundays shall be paid at one and one-half times the hourly rate of wage. All hours worked on holidays shall be paid at double the hourly rate of wage.

Q. The first two (2) hours after eight (8) regular hours Monday through Friday and up to ten (10) hours worked on Saturdays shall be paid at one and one-half times the hourly rate of wage. All hours worked in excess of ten (10) hours per day Monday through Saturday and all hours worked on Sundays and holidays (except Christmas day) shall be paid at double the hourly rate of wage. All hours worked on Christmas day shall be paid at two and one-half times the hourly rate of wage.

R. All hours worked on Sundays and holidays shall be paid at two times the hourly rate of wage.

U. All hours worked on Saturdays shall be paid at one and one-half times the hourly rate of wage. All hours worked on Sundays and holidays (except Labor Day) shall be paid at two times the hourly rate of wage. All hours worked on Labor Day shall be paid at three times the hourly rate of wage.

V. All hours worked on Sundays and holidays (except Thanksgiving Day and Christmas day) shall be paid at one and one-half times the hourly rate of wage. All hours worked on Thanksgiving Day and Christmas day shall be paid at double the hourly rate of wage.

W. All hours worked on Saturdays and Sundays (except make-up days due to conditions beyond the control of the employer)) shall be paid at one and one-half times the hourly rate of wage. All hours worked on holidays shall be paid at double the hourly rate of wage.

X. The first four (4) hours after eight (8) regular hours Monday through Friday and the first twelve (12) hours on Saturday shall be paid at one and one-half times the hourly rate of wage. All hours worked over twelve (12) hours Monday through Saturday, Sundays and holidays shall be paid at double the hourly rate of wage. When holiday falls on Saturday or Sunday, the day before Saturday, Friday, and the day after Sunday, Monday, shall be considered the holiday and all work performed shall be paid at double the hourly rate of wage.

Y. All hours worked outside the hours of 5:00 am and 5:00 pm (or such other hours as may be agreed upon by any employer and the employee) and all hours worked in excess of eight (8) hours per day (10 hours per day for a 4 x 10 workweek) and on Saturdays and holidays (except labor day) shall be paid at one and one-half times the hourly rate of wage. (except for employees who are absent from work without prior approval on a scheduled workday during the workweek shall be paid at the straight-time rate until they have worked 8 hours in a day (10 in a 4 x 10 workweek) or 40 hours during that workweek.) All hours worked Monday through Saturday over twelve (12) hours and all hours worked on Sundays and Labor Day shall be paid at double the hourly rate of wage.

Z. All hours worked on Saturdays and Sundays shall be paid at one and one-half times the hourly rate of wage. All hours worked on holidays shall be paid the straight time rate of pay in addition to holiday pay.

Overtime Codes Continued

2. ALL HOURS WORKED IN EXCESS OF EIGHT (8) HOURS PER DAY OR FORTY (40) HOURS PER WEEK SHALL BE PAID AT ONE AND ONE-HALF TIMES THE HOURLY RATE OF WAGE.

   B. All hours worked on holidays shall be paid at one and one-half times the hourly rate of wage.

   F. The first eight (8) hours worked on holidays shall be paid at the straight hourly rate of wage in addition to the holiday pay. All hours worked in excess of eight (8) hours on holidays shall be paid at double the hourly rate of wage.

   M. This code appears to be missing. All hours worked on Saturdays, Sundays and holidays shall be paid at double the hourly rate of wage.

   O. All hours worked on Sundays and holidays shall be paid at one and one-half times the hourly rate of wage.

   R. All hours worked on Sundays and holidays and all hours worked over sixty (60) in one week shall be paid at double the hourly rate of wage.

   U. All hours worked on Saturdays shall be paid at one and one-half times the hourly rate of wage. All hours worked over 12 hours in a day or on Sundays and holidays shall be paid at double the hourly rate of wage.

3. ALL HOURS WORKED IN EXCESS OF EIGHT (8) HOURS PER DAY OR FORTY (40) HOURS PER WEEK SHALL BE PAID AT ONE AND ONE-HALF TIMES THE HOURLY RATE OF WAGE.

   F. All hours worked on Saturday shall be paid at one and one-half times the hourly rate of wage. All hours worked on Sunday shall be paid at two times the hourly rate of wage. All hours worked on paid holidays shall be paid at two and one-half times the hourly rate of wage including holiday pay.

   H. All work performed on Sundays between March 16th and October 14th and all Holidays shall be compensated for at two (2) times the regular rate of pay. Work performed on Sundays between October 15th and March 15th shall be compensated at one and one half (1-1/2) times the regular rate of pay.

   J. All hours worked between the hours of 10:00 pm and 5:00 am, Monday through Friday, and all hours worked on Saturdays shall be paid at a one and one-half times the hourly rate of wage. All hours worked on Sundays and holidays shall be paid at double the hourly rate of wage.

   K. Work performed in excess of eight (8) hours of straight time per day, or ten (10) hours of straight time per day when four ten (10) hour shifts are established, or forty (40) hours of straight time per week, Monday through Friday, or outside the normal 5 am to 6pm shift, and all work on Saturdays shall be paid at one and one-half times the hourly rate of wage. All work performed after 6:00 pm Saturday to 5:00 am Monday and Holidays, and all hours worked in excess of twelve (12) hours in a single shift shall be paid at double the hourly rate of wage.

   After an employee has worked eight (8) hours at an applicable overtime rate, all additional hours shall be at the applicable overtime rate until such time as the employee has had a break of eight (8) hours or more. When an employee returns to work without at least eight (8) hours time off since their previous shift, all such time shall be a continuation of shift and paid at the applicable overtime rate until he/she shall have the eight (8) hours rest period.

4. ALL HOURS WORKED IN EXCESS OF EIGHT (8) HOURS PER DAY OR FORTY (40) HOURS PER WEEK SHALL BE PAID AT ONE AND ONE-HALF TIMES THE HOURLY RATE OF WAGE.

   A. All hours worked in excess of eight (8) hours per day or forty (40) hours per week shall be paid at double the hourly rate of wage. All hours worked on Saturdays, Sundays and holidays shall be paid at double the hourly rate of wage.

Overtime Codes Continued

4. C. On Monday through Friday, the first four (4) hours of overtime after eight (8) hours of straight time work shall be paid at one and one half (1-1/2) times the straight time rate of pay, unless a four (4) day ten (10) hour workweek has been established. On a four (4) day ten (10) hour workweek scheduled Monday through Thursday, or Tuesday through Friday, the first two (2) hours of overtime after ten (10) hours of straight time work shall be paid at one and one half (1-1/2) times the straight time rate of pay. On Saturday, the first twelve (12) hours of work shall be paid at one and one half (1-1/2) times the straight time rate of pay, except that if the job is down on Monday through Friday due to weather conditions or other conditions outside the control of the employer, the first ten (10) hours on Saturday may be worked at the straight time rate of pay. All hours worked over twelve (12) hours in a day and all hours worked on Sunday and Holidays shall be paid at two (2) times the straight time rate of pay.

D. All hours worked in excess of eight (8) hours per day or forty (40) hours per week shall be paid at double the hourly rate of wage. All hours worked on Saturday, Sundays and holidays shall be paid at double the hourly rate of pay. Rates include all members of the assigned crew.

EXCEPTION:
On all multipole structures and steel transmission lines, switching stations, regulating, capacitor stations, generating plants, industrial plants, associated installations and substations, except those substations whose primary function is to feed a distribution system, will be paid overtime under the following rates:

The first two (2) hours after eight (8) regular hours Monday through Friday of overtime on a regular workday, shall be paid at one and one-half times the hourly rate of wage. All hours in excess of ten (10) hours will be at two (2) times the hourly rate of wage. The first eight (8) hours worked on Saturday will be paid at one and one-half (1-1/2) times the hourly rate of wage. All hours worked in excess of eight (8) hours on Saturday, and all hours worked on Sundays and holidays will be at the double the hourly rate of wage.

All overtime eligible hours performed on the above described work that is energized, shall be paid at the double the hourly rate of wage.

E. The first two (2) hours after eight (8) regular hours Monday through Friday and the first eight (8) hours on Saturday shall be paid at one and one-half times the hourly rate of wage. All other hours worked Monday through Saturday, and all hours worked on Sundays and holidays shall be paid at double the hourly rate of wage.

On a four-day, ten-hour weekly schedule, either Monday thru Thursday or Tuesday thru Friday schedule, all hours worked after ten shall be paid at double the hourly rate of wage. The Monday or Friday not utilized in the normal four-day, ten hour work week, and Saturday shall be paid at one and one half (1½) times the regular shift rate for the first eight (8) hours. All other hours worked Monday through Saturday, and all hours worked on Sundays and holidays shall be paid at double the hourly rate of wage.

G. All hours worked on Saturdays shall be paid at one and one-half times the hourly rate of wage. All hours worked Monday through Saturday over twelve (12) hours and all hours worked on Sundays and holidays shall be paid at double the hourly rate of wage.

I. The First eight (8) hours worked on Saturdays shall be paid at one and one-half times the hourly rate of wage. All hours worked in excess of eight (8) per day on Saturdays shall be paid at double the hourly rate of wage. All hours worked on Sundays and holidays shall be paid at double the hourly rate of wage.

Overtime Codes Continued

4. J. The first eight (8) hours worked on a Saturday shall be paid at one and one-half times the hourly rate of wage. All hours worked in excess of eight (8) hours on a Saturday shall be paid at double the hourly rate of wage. All hours worked over twelve (12) in a day, and all hours worked on Sundays and Holidays shall be paid at double the hourly rate of wage.

K. All hours worked on a Saturday shall be paid at one and one-half times the hourly rate of wage, so long as Saturday is the sixth consecutive day worked. All hours worked over twelve (12) in a day Monday through Saturday, and all hours worked on Sundays and Holidays shall be paid at double the hourly rate of wage.

L. The first twelve (12) hours worked on a Saturday shall be paid at one and one-half times the hourly rate of wage. All hours worked on a Saturday in excess of twelve (12) hours shall be paid at double the hourly rate of pay. All hours worked over twelve (12) in a day Monday through Friday, and all hours worked on Sundays shall be paid at double the hourly rate of wage. All hours worked on a holiday shall be paid at one and one-half times the hourly rate of wage, except that all hours worked on Labor Day shall be paid at double the hourly rate of pay.

S. On a four (4) day ten (10) hour workweek scheduled Monday through Thursday, or Tuesday through Friday, work performed in excess of (10) hours shall be paid at one and one half (1-1/2) times the hourly rate of pay. On Monday through Friday, work performed outside the normal work hours of 6:00 a.m. and 6:00 p.m. shall be paid at one and one-half (1-1/2) times the straight time rate, (except for special shifts or multiple shift operations).

All hours worked on Saturdays shall be paid at one and one-half times the hourly rate of wage. All work performed on Sundays and holidays shall be paid at double the hourly rate of wage.

When an employee returns to work without at least eight (8) hours time off since their previous shift, all such time shall be a continuation of shift and paid at the applicable overtime rate until such time as the employee has had a break of eight (8) hours.

Multiple Shift Operations: When the first shift of a multiple shift (a two or three shift) operation is started at the basic straight time rate or at a specific overtime rate, all shifts of that day's operation shall be completed at that rate.

Special Shifts: The Special Shift Premium is the basic hourly rate of pay plus $2.00 an hour. When due to conditions beyond the control of the employer or when an owner (not acting as the contractor), a government agency or the contract specifications require more than four (4) hours of a special shift can only be performed outside the normal 6am to 6pm shift then the special shift premium will be applied to the basic straight time for the entire shift. When an employee works on a special shift, they shall be paid the special shift premium for each hour worked unless they are in overtime or double-time status. (For example, the special shift premium does not waive the overtime requirements for work performed on Saturday or Sunday).

U. The first four (4) hours after eight (8) regular hours Monday through Friday and the first twelve (12) hours on Saturday shall be paid at one and one-half times the hourly rate of wage. (Except on makeup days if work is lost due to inclement weather, then the first eight (8) hours on Saturday may be paid the regular rate.) All hours worked over twelve (12) hours Monday through Saturday, and all hours worked on Sundays and holidays shall be paid at double the hourly rate of wage.

Overtime Codes Continued

4. V. Work performed in excess of ten (10) hours of straight time per day when four ten (10) hour shifts are established or outside the normal shift (5 am to 6pm), and all work on Saturdays, except for make-up days shall be paid at time and one-half (1 ½) the straight time rate.

In the event the job is down due to weather conditions, then Saturday may, be worked as a voluntary make-up day at the straight time rate. However, Saturday shall not be utilized as a make-up day when a holiday falls on Friday. All work performed on Sundays and holidays and work in excess of twelve (12) hours per day shall be paid at double (2x) the straight time rate of pay.

After an employee has worked eight (8) hours at an applicable overtime rate, all additional hours shall be at the applicable overtime rate until such time as the employee has had a break of eight (8) hours.

When an employee returns to work without a break of eight (8) hours since their previous shift, all such time shall be a continuation of shift and paid at the applicable overtime rate until such time as the employee has had a break of eight (8) hours.

W. All hours worked on Saturdays (except makeup days if work is lost due to inclement weather conditions) shall be paid at one and one-half times the hourly rate of wage. All hours worked on Sundays and holidays shall be paid at double the hourly rate of wage.

When an employee returns to work without at least eight (8) hours time off since their previous shift, all such time shall be a continuation of shift and paid at the applicable overtime rate until such time as the employee has had a break of eight (8) hours.

X. All hours worked on Saturdays shall be paid at one and one-half times the hourly rate of wage. All hours worked on Sundays and holidays shall be paid at double the hourly rate of wage. Work performed outside the normal shift of 6 am to 6pm shall be paid at one and one-half the straight time rate, (except for special shifts or three shift operations). All work performed on Sundays and holidays shall be paid at double the hourly rate of wage. Shifts may be established when considered necessary by the Employer.

The Employer may establish shifts consisting of eight (8) or ten (10) hours of work (subject to WAC 296-127-022), that shall constitute a normal forty (40) hour work week. The Employer can change from a 5-eight to a 4-ten hour schedule or back to the other. All hours of work on these shifts shall be paid for at the straight time hourly rate. Work performed in excess of eight hours (or ten hours per day (subject to WAC 296-127-022) shall be paid at one and one-half the straight time rate.

When due to conditions beyond the control of the Employer, or when contract specifications require that work can only be performed outside the regular day shift, then by mutual agreement a special shift may be worked at the straight time rate, eight (8) hours work for eight (8) hours pay. The starting time shall be arranged to fit such conditions of work.

When an employee returns to work without at a break of eight (8) hours since their previous shift, all such time shall be a continuation of shift and paid at the applicable overtime rate until such time as the employee has had a break of eight (8) hours.

Y. Work performed in excess of eight (8) hours of straight time per day, or ten (10) hours of straight time per day when four ten (10) hour shifts are established, or forty (40) hours of straight time per week, Monday through Friday, or outside the normal shift, and all work on Saturdays shall be paid at time and one-half the straight time rate. All work performed after 6:00 pm Saturday to 6:00 am Monday and holidays shall be paid at double the straight time rate of pay.

Any shift starting between the hours of 6:00 pm and midnight shall receive an additional one dollar ($1.00) per hour for all hours worked that shift.

After an employee has worked eight (8) hours at an applicable overtime rate, all additional hours shall be at the applicable overtime rate until such time as the employee has had a break of eight (8) hours or more.

Overtime Codes Continued

11. ALL HOURS WORKED IN EXCESS OF EIGHT (8) HOURS PER DAY OR FORTY (40) HOURS PER WEEK SHALL BE PAID AT ONE AND ONE-HALF TIMES THE HOURLY RATE OF WAGE.

B After an employee has worked eight (8) hours, all additional hours worked shall be paid at the applicable overtime rate until such time as the employee has had a break of eight (8) hours or more.

C The first two (2) hours after eight (8) regular hours Monday through Friday and the first eight (8) hours on Saturday shall be paid at one and one-half times the hourly rate of wage. All other overtime hours worked, except Labor Day, and all hours on Sunday shall be paid at double the hourly rate of wage. All hours worked on Labor Day shall be paid at three times the hourly rate of wage. All non-overtime and non-holiday hours worked between 4:00 pm and 5:00 am, Monday through Friday, shall be paid at a premium rate of 15% over the hourly rate of wage.

D. All hours worked on Saturdays and holidays shall be paid at one and one-half times the hourly rate of wage. All hours worked on Sundays shall be paid at double the hourly rate of wage.

After an employee has worked eight (8) hours, all additional hours worked shall be paid at the applicable overtime rate until such time as the employee has had a break of eight (8) hours or more.

E. The first two (2) hours after eight (8) regular hours Monday through Friday, the first ten (10) hours on Saturday, and the first ten (10) hours worked on Holidays shall be paid at one and one-half times the hourly rate of wage. All hours worked over ten (10) hours Monday through Saturday, and Sundays shall be paid at double the hourly rate of wage.

After an employee has worked eight (8) hours, all additional hours worked shall be paid at the applicable overtime rate until such time as the employee has had a break of eight (8) hours or more.

F. The first two (2) hours after eight (8) regular hours Monday through Friday and the first eight (8) hours on Saturday shall be paid at one and one-half times the hourly rate of wage. All other hours worked Monday through Saturday, and all hours worked on Sundays and holidays shall be paid at double the hourly rate of wage.

On a four-day, ten-hour weekly schedule, either Monday thru Thursday or Tuesday thru Friday schedule, all hours worked after ten shall be paid at double the hourly rate of wage. The Monday or Friday not utilized in the normal four-day, ten hour work week, and Saturday shall be paid at one-half times the hourly rate of wage for the first eight (8) hours. All other hours worked Monday through Saturday, and all hours worked on Sundays and holidays shall be paid at double the hourly rate of wage.

G. Work performed in excess of eight (8) hours of straight time per day, or ten (10) hours of straight time per day when four ten (10) hour shifts are established, or forty (40) hours of straight time per week, Monday through Friday, or outside the normal 5 am to 6pm shift, and all work on Saturdays shall be paid at one and one-half times the hourly rate of wage.

All work performed after 6:00 pm Saturday to 5:00 am Monday and Holidays, and all hours worked in excess of twelve (12) hours in a single shift shall be paid at double the hourly rate of wage.

After an employee has worked eight (8) hours at an applicable overtime rate, all additional hours shall be at the applicable overtime rate until such time as the employee has had a break of nine (9) hours or more. When an employee returns to work without at least nine (9) hours time off since their previous shift, all such time shall be a continuation of shift and paid at the applicable overtime rate until he/she shall have the nine (9) hours rest period.

Overtime Codes Continued

11. H. Work performed in excess of eight (8) hours of straight time per day, or ten (10) hours of straight time per day when four ten (10) hour shifts are established, or forty (40) hours of straight time per week, Monday through Friday, or outside the normal 5 am to 6pm shift, and all work on Saturdays shall be paid at one and one-half times the hourly rate of wage.

All work performed after 6:00 pm Saturday to 5:00 am Monday and Holidays, and all hours worked in excess of twelve (12) hours in a single shift shall be paid at double the hourly rate of wage.

After an employee has worked eight (8) hours at an applicable overtime rate, all additional hours shall be at the applicable overtime rate until such time as the employee has had a break of ten (10) hours or more. When an employee returns to work without at least ten (10) hours time off since their previous shift, all such time shall be a continuation of shift and paid at the applicable overtime rate until he/she shall have the ten (10) hours rest period.

I. On Monday through Friday, the first four (4) hours of overtime after eight (8) hours of straight time work shall be paid at one and one half (1-1/2) times the straight time rate of pay, unless a four (4) day ten (10) hour workweek has been established. On a four (4) day ten (10) hour workweek scheduled Monday through Thursday, or Tuesday through Friday, the first two (2) hours of overtime after ten (10) hours of straight time work shall be paid at one and one half (1-1/2) times the straight time rate of pay.

On Saturday, the first twelve (12) hours of work shall be paid at one and one half (1-1/2) times the straight time rate of pay. All work performed after 6:00 pm Saturday to 5:00 am Monday, all work performed over twelve (12) hours, and all work performed on holidays shall be paid at double the straight time rate of pay.

Any shift starting between the hours of 6:00 pm and midnight shall receive an additional two dollar ($2.00) per hour for all hours worked that shift.

J. All hours worked on holidays shall be paid at double the hourly rate of wage.

K. On Monday through Friday hours worked outside 4:00 am and 5:00 pm, and the first two (2) hours after eight (8) hours worked shall be paid at one and one-half times the hourly rate. All hours worked over 10 hours per day Monday through Friday, and all hours worked on Saturdays, Sundays, and Holidays worked shall be paid at double the hourly rate of wage.

L. An employee working outside 5:00 am and 5:00 pm shall receive an additional two dollar ($2.00) per hour for all hours worked that shift. All hours worked on holidays shall be paid at one and one-half times the hourly rate of wage. All hours worked on holidays shall be paid at one and one-half times the hourly rate of wage.

M. On Monday through Friday, the first four (4) hours of overtime after eight (8) hours of straight time work shall be paid at one and one half (1-1/2) times the straight time rate of pay, unless a four (4) day ten (10) hour workweek has been established. On a four (4) day ten (10) hour workweek scheduled Monday through Thursday, or Tuesday through Friday, the first two (2) hours of overtime after ten (10) hours of straight time work shall be paid at one and one half (1-1/2) times the straight time rate of pay.

Work performed outside the normal work hours of 5:00 a.m. and 6:00 p.m. shall be paid at one and one-half (1-1/2) times the straight time rate, (except for special shifts or multiple shift operations). When the first shift of a multiple shift (a two or three shift) operation is started at the basic straight time rate or at a specific overtime rate, all shifts of that day's operation shall be completed at that rate. When due to conditions beyond the control of the Employer or when contract specifications require that work can only be performed outside the regular day shift of 5:00 am to 6:00 pm, then a special shift may be worked at the straight time rate, plus the shift pay premium when applicable. The starting time of work will be arranged to fit such conditions of work. Such shift shall consist of eight (8) hours work for eight (8) hours pay or ten (10) hours work for ten (10) hours pay for four ten shifts.

On Saturday, the first twelve (12) hours of work shall be paid at one and one half (1-1/2) times the straight time rate of pay. All work performed after 6:00 pm Saturday to 5:00 am Monday, all work performed over twelve (12) hours,

and all work performed on holidays shall be paid at double the straight time rate of pay.

Shift Pay Premium: In an addition to any overtime already required, all hours worked between the hours of 6:00 pm and 5:00 am shall receive an additional two dollars ($2.00) per hour.

Holiday Codes

5. A. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Friday after Thanksgiving Day, and Christmas Day (7).

B. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Friday after Thanksgiving Day, the day before Christmas, and Christmas Day (8).

C. Holidays: New Year's Day, Presidents' Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving Day, And Christmas Day (8).

D. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday and Saturday after Thanksgiving Day, And Christmas Day (8).

H. Holidays: New Year's Day, Memorial Day, Independence Day, Thanksgiving Day, the Day after Thanksgiving Day, And Christmas (6).

I. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, and Christmas Day (6).

J. Holidays: New Year's Day, Memorial Day, Independence Day, Thanksgiving Day, Friday after Thanksgiving Day, Christmas Eve Day, And Christmas Day (7).

K. Holidays: New Year's Day, Presidents' Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Friday After Thanksgiving Day, The Day Before Christmas, And Christmas Day (9).

Holiday Codes Continued

6. L. Holidays: New Year's Day, Martin Luther King Jr. Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Friday after Thanksgiving Day, And Christmas Day (8).

N. Holidays: New Year's Day, Presidents' Day, Memorial Day, Independence Day, Labor Day, Veterans' Day, Thanksgiving Day, The Friday After Thanksgiving Day, And Christmas Day (9).

P. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Friday And Saturday After Thanksgiving Day, The Day Before Christmas, And Christmas Day (9). If A Holiday Falls On Sunday, The Following Monday Shall Be Considered As A Holiday.

Q. Paid Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, and Christmas Day (6).

R. Paid Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Day After Thanksgiving Day, One-Half Day Before Christmas Day, And Christmas Day. (7 1/2).

Holiday Codes Continued

S. Paid Holidays: New Year's Day, Presidents' Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, And Christmas Day (7).

Z. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Veterans Day, Thanksgiving Day, the Friday after Thanksgiving Day, And Christmas Day (8).

G. Paid Holidays: New Year's Day, Martin Luther King Jr. Day, Presidents' Day, Memorial Day, Independence Day, Labor Day, Veterans' Day, Thanksgiving Day, the Friday after Thanksgiving Day, Christmas Day, and Christmas Eve Day (11).

H. Paid Holidays: New Year's Day, New Year's Eve Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Friday After Thanksgiving Day, Christmas Day, The Day After Christmas, And A Floating Holiday (10).

T. Paid Holidays: New Year's Day, Presidents' Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, The Friday After Thanksgiving Day, The Last Working Day Before Christmas Day, And Christmas Day (9).

Z. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Friday after Thanksgiving Day, And Christmas Day (7). If a holiday falls on Saturday, the preceding Friday shall be considered as the holiday. If a holiday falls on Sunday, the following Monday shall be considered as the holiday.

7. A. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday and Saturday after Thanksgiving Day, And Christmas Day (8). Any Holiday Which Falls On A Sunday Shall Be Observed As A Holiday On The Following Monday. If any of the listed holidays falls on a Saturday, the preceding Friday shall be a regular work day.

B. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday and Saturday after Thanksgiving Day, And Christmas Day (8). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday. Any holiday which falls on a Saturday shall be observed as a holiday on the preceding Friday.

C. Holidays: New Year's Day, Martin Luther King Jr. Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving Day, And Christmas Day (8). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday. Any holiday which falls on a Saturday shall be observed as a holiday on the preceding Friday.

D. Paid Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Veteran's Day, Thanksgiving Day, the Friday after Thanksgiving Day, And Christmas Day (8). Unpaid Holidays: President's Day. Any paid holiday which falls on a Sunday shall be observed as a holiday on the following Monday. Any paid holiday which falls on a Saturday shall be observed as a holiday on the preceding Friday.

E. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving Day, And Christmas Day (7). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday. Any holiday which falls on a Saturday shall be observed as a holiday on the preceding Friday.

F. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving Day, the last working day before Christmas day and Christmas day (8). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday. Any holiday which falls on a Saturday shall be observed as a holiday on the preceding Friday.

Holiday Codes Continued

7. G. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, and Christmas Day (6). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday.

H. Holidays: New Year's Day, Martin Luther King Jr. Day, Independence Day, Memorial Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving Day, the Last Working Day before Christmas Day and Christmas Day (9). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday. Any holiday which falls on a Saturday shall be observed as a holiday on the preceding Friday.

I. Holidays: New Year's Day, President's Day, Independence Day, Memorial Day, Labor Day, Thanksgiving Day, The Friday After Thanksgiving Day, The Day Before Christmas Day And Christmas Day (9). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday. Any holiday which falls on a Saturday shall be observed as a holiday on the preceding Friday.

J. Holidays: New Year's Day, Independence Day, Memorial Day, Labor Day, Thanksgiving Day and Christmas Day (6). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday. Any holiday which falls on a Saturday shall be observed as a holiday on the preceding Friday.

K. Holidays: New Year's Day, Memorial Day, Independence Day, Thanksgiving Day, the Friday and Saturday after Thanksgiving Day, And Christmas Day (8). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday. Any holiday which falls on a Saturday shall be observed as a holiday on the preceding Friday.

L. Holidays: New Year's Day, Memorial Day, Labor Day, Independence Day, Thanksgiving Day, the Last Work Day before Christmas Day, And Christmas Day (7). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday. Any holiday which falls on a Saturday shall be observed as a holiday on the preceding Friday.

N. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving Day, And Christmas Day (7). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday. When Christmas falls on a Saturday, the preceding Friday shall be observed as a holiday.

P. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Friday after Thanksgiving Day, And Christmas Day (7). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday.

Q. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving Day, the Last Working Day before Christmas Day and Christmas Day (8). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday. If any of the listed holidays falls on a Saturday, the preceding Friday shall be a regular work day.

S. Paid Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Friday after Thanksgiving Day, Christmas Day, the Day after Christmas, and A Floating Holiday (9). If any of the listed holidays falls on a Sunday, the day observed by the Nation shall be considered a holiday and compensated accordingly.

V. Holidays: New Year's Day, President's Birthday, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving Day, Christmas Day, the day before or after Christmas, and the day before or after New Year's Day. If any of the above listed holidays falls on a Sunday, the day observed by the Nation shall be considered a holiday and compensated accordingly.

W. Holidays: New Year's Day, Day After New Year's, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving Day, Christmas Eve Day, Christmas Day, the day after Christmas, the day before New Year's Day, and a Floating Holiday.

Holiday Codes Continued

7. X. Holidays: New Year's Day, Day before or after New Year's Day, Presidents' Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving Day, Christmas Day, and the day before or after Christmas day. If a holiday falls on a Saturday or on a Friday that is the normal day off, then the holiday will be taken on the last normal workday. If the holiday falls on a Monday that is the normal day off or on a Sunday, then the holiday will be taken on the next normal workday.

Y. Holidays: New Year's Day, Presidents' Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving Day, and Christmas Day. (8) If the holiday falls on a Sunday, then the day observed by the federal government shall be considered a holiday and compensated accordingly.

G. New Year's Day, Washington's Birthday, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, The Friday After Thanksgiving Day, the last scheduled workday before Christmas, and Christmas Day (9). If any of the listed holidays falls on a Sunday, the day observed by the Nation shall be considered a holiday and compensated accordingly.

H. Holidays: New Year's Day, Martin Luther King Jr. Day, Independence Day, Memorial Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving Day, the Last Working Day before Christmas Day and Christmas Day (9). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday. Any holiday which falls on a Saturday shall be observed as a holiday on the preceding Friday.

I. Holidays: New Year's Day, President's Day, Independence Day, Memorial Day, Labor Day, Thanksgiving Day, The Friday After Thanksgiving Day, The Day Before Christmas Day And Christmas Day (9). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday. Any holiday which falls on a Saturday shall be observed as a holiday on the preceding Friday.

J. Holidays: New Year's Day, Independence Day, Memorial Day, Labor Day, Thanksgiving Day and Christmas Day (6). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday. Any holiday which falls on a Saturday shall be observed as a holiday on the preceding Friday.

K. Holidays: New Year's Day, Memorial Day, Independence Day, Thanksgiving Day, the Friday and Saturday after Thanksgiving Day, And Christmas Day (8). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday. Any holiday which falls on a Saturday shall be observed as a holiday on the preceding Friday.

L. Holidays: New Year's Day, Memorial Day, Labor Day, Independence Day, Thanksgiving Day, the Last Work Day before Christmas Day, And Christmas Day (7). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday. Any holiday which falls on a Saturday shall be observed as a holiday on the preceding Friday.

N. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving Day, And Christmas Day (7). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday. When Christmas falls on a Saturday, the preceding Friday shall be observed as a holiday.

P. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Friday after Thanksgiving Day, And Christmas Day (7). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday.

Q. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving Day, the Last Working Day before Christmas Day and Christmas Day (8). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday. If any of the listed holidays falls on a Saturday, the preceding Friday shall be a regular work day.

S. Paid Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Friday after Thanksgiving Day, Christmas Day, the Day after Christmas, and A Floating Holiday (9). If any of the listed holidays falls on a Sunday, the day observed by the Nation shall be considered a holiday and compensated accordingly.

Holiday Codes Continued

7. V. Holidays: New Year's Day, President's Birthday, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving Day, Christmas Day, the day before or after Christmas, and the day before or after New Year's Day. If any of the above listed holidays falls on a Sunday, the day observed by the Nation shall be considered a holiday and compensated accordingly.

W. Holidays: New Year's Day, Day After New Year's, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving Day, Christmas Eve Day, Christmas Day, the day after Christmas, the day before New Year's Day, and a Floating Holiday.

X. Holidays: New Year's Day, Day before or after New Year's Day, Presidents' Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving Day, Christmas Day, and the day before or after Christmas day. If a holiday falls on a Saturday or on a Friday that is the normal day off, then the holiday will be taken on the last normal workday. If the holiday falls on a Monday that is the normal day off or on a Sunday, then the holiday will be taken on the next normal workday.

Y. Holidays: New Year's Day, Presidents' Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving Day, and Christmas Day. (8) If the holiday falls on a Sunday, then the day observed by the federal government shall be considered a holiday and compensated accordingly.

Z. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday and Saturday after Thanksgiving Day, Christmas Eve, and Christmas Day (9). Any holiday which falls on a Saturday shall be observed as a holiday on the preceding Friday. Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday.

15. G. New Year's Day, Washington's Birthday, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, The Friday After Thanksgiving Day, the last scheduled workday before Christmas, and Christmas Day (9). If any of the listed holidays falls on a Sunday, the day observed by the Nation shall be considered a holiday and compensated accordingly.

H. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Friday after Thanksgiving Day, Christmas Eve Day, and Christmas Day (8). When the following holidays fall on a Saturday (New Year's Day, Independence Day, and Christmas Day) the preceding Friday will be considered as the holiday; should they fall on a Sunday, the following Monday shall be considered as the holiday.

I. Holidays: New Year's Day, President's Day, Memorial Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving Day, Christmas Day, the last regular workday before Christmas (8). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday.

J. Holidays: New Year's Day, Martin Luther King Jr. Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday and Saturday after Thanksgiving Day, and Christmas Day (9). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday. If any of the listed holidays falls on a Saturday, the preceding Friday shall be a regular work day.

Note Codes

8. D. Workers working with supplied air on hazmat projects receive an additional $1.00 per hour.

L. Workers on hazmat projects receive additional hourly premiums as follows -Level A: $0.75, Level B: $0.50, And Level C: $0.25.

M. Workers on hazmat projects receive additional hourly premiums as follows: Levels A & B: $1.00, Levels C & D: $0.50.

N. Workers on hazmat projects receive additional hourly premiums as follows -Level A: $1.00, Level B: $0.75, Level C: $0.50, And Level D: $0.25.

S. Effective August 31, 2012 – A Traffic Control Supervisor shall be present on the project whenever flagging or spotting or other traffic control labor is being utilized. Flaggers and Spotters shall be posted where shown on approved Traffic Control Plans or where directed by the Engineer. All flaggers and spotters shall possess a current flagging card issued by the State of Washington, Oregon, Montana, or Idaho. This classification is only effective on or after August 31, 2012.

T. Effective August 31, 2012 – A Traffic Control Laborer performs the setup, maintenance and removal of all temporary traffic control devices and construction signs necessary to control vehicular, bicycle, and pedestrian traffic during construction operations. Flaggers and Spotters shall be posted where shown on approved Traffic Control Plans or where directed by the Engineer. All flaggers and spotters shall possess a current flagging card issued by the State of Washington, Oregon, Montana, or Idaho. This classification is only effective on or after August 31, 2012.

U. Workers on hazmat projects receive additional hourly premiums as follows – Class A Suit: $2.00, Class B Suit: $1.50, And Class C Suit: $1.00. Workers performing underground work receive an additional $0.40 per hour for any and all work performed underground, including operating, servicing and repairing of equipment. The premium for underground work shall be paid for the entire shift worked. Workers who work suspended by a rope or cable receive an additional $0.50 per hour. The premium for work suspended shall be paid for the entire shift worked. Workers who do “pioneer” work (break open a cut, build road, etc.) more than one hundred fifty (150) feet above grade elevation receive an additional $0.50 per hour.

V. In addition to the hourly wage and fringe benefits, the following depth and enclosure premiums shall be paid. The premiums are to be calculated for the maximum depth and distance into an enclosure that a diver reaches in a day. The premiums are to be paid one time for the day and are not used in calculating overtime pay.

Depth premiums apply to depths of fifty feet or more. Over 50' to 100' - $2.00 per foot for each foot over 50 feet. Over 101' to 150' - $3.00 per foot for each foot over 101 feet. Over 151' to 220' - $4.00 per foot for each foot over 220 feet. Over 221' - $5.00 per foot for each foot over 221 feet.

Enclosure premiums apply when divers enter enclosures (such as pipes or tunnels) where there is no vertical ascent and is measured by the distance travelled from the entrance. 25’ to 300’ - $1.00 per foot from entrance. 300’ to 600’ - $1.50 per foot beginning at 300’. Over 600’ - $2.00 per foot beginning at 600’.

W. Meter Installers work on single phase 120/240V self-contained residential meters. The Lineman/Groundmen rates would apply to meters not fitting this description.

Note Codes Continued

8. X. Workers on hazmat projects receive additional hourly premiums as follows - Class A Suit: $2.00, Class B Suit: $1.50, Class C Suit: $1.00, and Class D Suit: $0.50. Special Shift Premium: Basic hourly rate plus $2.00 per hour.

When due to conditions beyond the control of the Employer or when an owner (not acting as the contractor), a government agency or the contract specifications requires that work can only be performed outside the normal 5 am to 6pm shift, then the special shift premium will be applied to the basic hourly rate. When an employee works on a special shift, they shall be paid a special shift premium for each hour worked unless they are in OT or Double-time status. (For example, the special shift premium does not waive the overtime requirements for work performed on Saturday or Sunday.)

Y. Tide Work: When employees are called out between the hours of 6:00 p.m. and 6:00 a.m. to work on tide work (work located in the tide plane) all time worked shall be at one and one-half times the hourly rate of pay.

Swinging Stage/Boatswains Chair: Employees working on a swinging state or boatswains chair or under conditions that require them to be tied off to allow their hands to be free shall receive seventy-five cents ($0.75) per hour above the classification rate.

Z. Workers working with supplied air on hazmat projects receive an additional $1.00 per hour.

Special Shift Premium: Basic hourly rate plus $2.00 per hour. When due to conditions beyond the control of the Employer or when an owner (not acting as a contractor), a government agency or the contract specifications require that more than (4) hours of a special shift can only be performed outside the normal 6 am to 6pm shift, then the special shift premium will be applied to the basic straight time for the entire shift. When an employee works on a special shift, they will be paid a special shift premium for each hour worked unless they are in overtime or double-time status. (For example, the special shift premium does not waive the overtime requirements for work performed on Saturday or Sunday.)

9. A. Workers working with supplied air on hazmat projects receive an additional $1.00 per hour.

Special Shift Premium: Basic hourly rate plus $2.00 per hour. When due to conditions beyond the control of the Employer or when an owner (not acting as the contractor), a government agency or the contract specifications require that more than four (4) hours of a special shift can only be performed outside the normal 6 am to 6pm shift, then the special shift premium will be applied to the basic straight time for the entire shift. When an employee works on a special shift, they shall be paid a special shift premium for each hour worked unless they are in overtime or double-time status. (For example, the special shift premium does not waive the overtime requirements for work performed on Saturday or Sunday.)

Certified Crane Operator Premium: Crane operators requiring certifications shall be paid $0.50 per hour above their classification rate.

Boom Pay Premium: All cranes including tower shall be paid as follows based on boom length:

(A) – 130’ to 199’ – $0.50 per hour over their classification rate.
(B) – 200’ to 299’ – $0.80 per hour over their classification rate.
(C) – 300’ and over – $1.00 per hour over their classification rate.

Note Codes Continued

9. B. The highest pressure registered on the gauge for an accumulated time of more than fifteen (15) minutes during the shift shall be used in determining the scale paid.

Tide Work: When employees are called out between the hours of 6:00 p.m. and 6:00 a.m. to work on tide work (work located in the tide plane) all time worked shall be at one and one-half times the hourly rate of pay. Swinging Stage/Boatswains Chair: Employees working on a swinging stage or boatswains chair or under conditions that require them to be tied off to allow their hands to be free shall receive seventy-five cents ($0.75) per hour above the classification rate.

C. Tide Work: When employees are called out between the hours of 6:00 p.m. and 6:00 a.m. to work on tide work (work located in the tide plane) all time worked shall be at one and one-half times the hourly rate of pay. Swinging Stage/Boatswains Chair: Employees working on a swinging stage or boatswains chair or under conditions that require them to be tied off to allow their hands to be free shall receive seventy-five cents ($0.75) per hour above the classification rate.

Effective August 31, 2012 – A Traffic Control Supervisor shall be present on the project whenever flagging or spotting or other traffic control labor is being utilized. A Traffic Control Laborer performs the setup, maintenance and removal of all temporary traffic control devices and construction signs necessary to control vehicular, bicycle, and pedestrian traffic during construction operations. Flaggers and Spotters shall be posted where shown on approved Traffic Control Plans or where directed by the Engineer. All flaggers and spotters shall possess a current flagging card issued by the State of Washington, Oregon, Montana, or Idaho. These classifications are only effective on or after August 31, 2012.

D. Industrial Painter wages are required for painting within industrial facilities such as treatment plants, pipelines, towers, dams, bridges, power generation facilities and manufacturing facilities such as chemical plants, etc., or anywhere abrasive blasting is necessary to prepare surfaces, or hazardous materials encapsulation is required.

E. Heavy Construction includes construction, repair, alteration or additions to the production, fabrication or manufacturing portions of industrial or manufacturing plants, hydroelectric or nuclear power plants and atomic reactor construction. Workers on hazmat projects receive additional hourly premiums as follows -Level A: $1.00, Level B: $0.75, Level C: $0.50, And Level D: $0.25.

F. Industrial Painter wages are required for painting within industrial facilities such as treatment plants, pipelines, towers, dams, power generation facilities and manufacturing facilities such as chemical plants, etc., or anywhere abrasive blasting is necessary to prepare surfaces, or hazardous materials encapsulation is required.

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Procedures for preparation and submittal of the Schedule of Values.

1.02 SUBMITTALS

A. Contractor shall submit an initial Schedule of Values per the Pre-Construction Submittal Requirements of Section 01 33 00.

B. Contractor shall submit supporting documentation justifying the amounts in the Schedule of Values if requested by Owner.

1.03 SCHEDULE OF VALUES

A. Contractor shall submit a typed schedule on Owner's form. Once approved, Contractor shall not revise the Schedule of Values without prior approval by Owner.

B. Format:

1. Separate each category of Work into a separate line item.
2. List all major Work activities indicated on the Progress Schedule.
3. Separate floors, phases, and other easily recognized building divisions when appropriate.
4. Separate labor, materials and equipment for each item.
5. Identify site mobilization, demobilization, bonds, and insurance as individual line items.
6. Include a line item for close-out Work between Substantial Completion and Final Completion.
7. If applicable, include a line item for allowances. For unit cost allowances, give quantities measured from the Contract Documents multiplied by the unit cost.
8. When required by Owner, include separate line items for "separately funded Work."

END OF SECTION 01 29 73

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Preconstruction Meeting;
2. Progress Meetings; and
3. Other meetings, as requested by Owner.

1.02 PRECONSTRUCTION MEETING

A. Meeting Location: Owner will schedule a meeting prior to the start of construction. The purpose of this meeting is to review Contract administration requirements and mobilization procedures. Attendance is required for the following:

1. Architect/Engineer and design Subconsultants;
2. Contractor's Superintendent and Project Manager;
3. Representative of major Subcontractors, as appropriate;
4. Others, as appropriate.

B. Owner's Designated Representative shall:

1. Preside over and conduct meeting.
2. Record, reproduce, and distribute copies of minutes within 7 Days of the meeting to all meeting participants.

C. Agenda for the meeting will include at a minimum:

1. The Work;
2. Progress Schedule, including Work sequence, phasing, and occupancy requirements;
3. Communications chain and persons authorized to direct changes;
4. Use of the Project site;
5. Special Project procedures;
6. Procedures and processing:
    a. Application for Payments and Schedule of Values;
    b. Contract Change Proposals (CCP), Work Directive (WD);
    c. Change Orders (CO);

d. Requests for Information (RFI);

e. Submittals; and

f. Others as appropriate.

7. Project Record;
8. Construction facilities, controls, and construction aids;
9. Temporary utilities;
10. Security procedures;
11. Safety and first-aid procedures;
12. Environmental Health and Safety;
13. Housekeeping procedures;
14. AHJ representative(s) and inspection procedures;
15. Utility shutdowns;
16. Parking;
17. Existing conditions;
18. Subcontractor list;
19. Emergency phone and keys to site;
20. Progress meeting scheduling;
21. Shipment and deliveries; and
22. Other(s) as appropriate.

1.03 PROGRESS MEETINGS

A. Progress meetings will occur monthly until chiller arrives and weekly from there onwards.

B. Meeting Location: Contractor's Project field office, unless otherwise agreed.

C. Attendance: Representatives attending meetings must be qualified and authorized to act on behalf of their firms. Attendance shall include:

1. Architect/Engineer and Subconsultants, as appropriate;
2. Owner’s Designated Representatives;
3. Contractor's Superintendent and Project Manager;
4. Subcontractors, as appropriate;
5. Suppliers, as appropriate; and
6. Others, as appropriate.

D. Owner’s Designated Representative shall:

1. Administer progress and other specially scheduled meetings;

2. Record, reproduce, and distribute copies of minutes within 6 Days of meeting to all meeting participants; and

E. Contractor shall, at each meeting, provide each meeting attendant with:

1. Short-interval (look-ahead) schedule coordinated with the Progress Schedule;
2. Updated Progress Schedule, if appropriate;
3. Updated submittal log and schedules;
4. Updated RFI log;
5. Issues Log;
6. Quality Control Log; and
7. Any applicable tracking mechanisms.

F. Agenda for these meetings will include at a minimum:

1. Project safety;
2. Review and approval of minutes from previous meeting;
3. Review Work progress since previous meeting;
4. Review plans for progress for subsequent Work period and short-interval (look-ahead) schedule;
5. Review Progress Schedule;
6. Present corrective measures and procedures to regain Progress Schedule, as applicable;
7. Present field observations, problems, and conflicts;
8. Discuss RFIs;
9. Review quality control;
10. Review submittal log and schedules and present methods to expedite as required;
11. Review off-site fabrication;
12. Review delivery schedules;
13. Review coordination issues;
14. Review proposed changes for:
    a. Effect on Progress Schedule and on completion date.
    b. Effect on any other contracts of the Project.
15. Review Issues Log;

16. Review draft Application for Payment (at end of month);
17. Review Project Record; and
18. Review any other issues.

1.04 OTHER MEETINGS

A. Owner may call additional Project meetings as appropriate.

B. Meetings as required by other sections.

C. Format and agenda of these meetings will follow that of Progress Meetings unless Owner determines otherwise.

END OF SECTION 01 31 19

PART 1 GENERAL

1.01 GENERAL COMMUNICATION

A. Subcontractors: Informal communication between Owner, Owner's consultants, and other Subcontractors is permitted. If written clarification or direction is required to resolve questions, transmit questions in writing using a Request for Information (RFI) through the Contractor to Owner.

B. In case of an EMERGENCY, dial 9-1-1 if appropriate; otherwise, contact Owner's Designated Representative. If he or she is not available contact Facilities Services, Capital at 509-335-9000.

1.02 CORRESPONDENCE

A. Address all correspondence to Owner's Designated Representative.

B. Contractor shall copy Architect/Engineer on all correspondence to and from Owner.

C. Include Project title and Owner Project number on all correspondence.

1.03 REQUEST FOR INFORMATION

A. When field conditions or Contract Document require clarification, a written Request for Information (RFI) must be submitted per the following:

1. Identify the nature and location of each clarification/verification using a RFI form and provide at least the following information:
    a. Project name and number;
    b. Date;
    c. Date response requested;
    d. RFI number;
    e. Subject;
    f. Initiator of the question;
    g. Indication of costs;
    h. Indication of schedule impact;
    i. Location on site;
    j. Contract Drawing reference;
    k. Contract Specification section and paragraph reference;
    l. Descriptive text;
    m. Recommended solution(s); and

n. Space for reply on same page as questions.

B. Each RFI must be limited to a single issue, but shall reference other related RFI's.

C. Route and copy RFIs in same manner as correspondence.

D. Allow a minimum of 14 Days for Owner response to RFI.

1.04 NONCONFORMANCE REPORT

A. Reference Document: Owner Nonconformance Report (NCR).

B. Procedure: If Contractor proceeds to install deficient Work or fails to correct Work that in the opinion of Owner fails to conform to the Contract Documents, an NCR may be issued. Upon receipt of a NCR, Contractor shall take immediate action to correct nonconforming Work. Correction of nonconforming Work will be reviewed at progress meetings.

1.05 COORDINATION

A. Special Coordination: Contractor shall:

1. Contractor shall keep the Tri-Cities Facilities Department fully informed of all utility shutdowns and outages so that they can properly inform the building occupants.

2. Contractor shall minimize the period in which the building has no chiller capability.

3. The contractor shall access the work site via the fire lane on the North and East sides of the building.

4. Contractor staging area will be in the large open dirt area to the North of the building.

5. Elevator use is permitted (in Room 100 only), though usage during peak times (9am-3:30pm) to be kept to a minimum.

6. Contractor may use protective blankets on elevator walls or use them to cover equipment if necessary. Care must be taken if using the elevator to move large and/or heavy equipment. Protective blankets must be used to cover interior walls and protect from damage. The blankets need to be removed at the end of each day.

B. General Coordination: Contractor shall:

1. Coordinate with Work of other sections to ensure that all fixtures, devices, switches, outlets, ducts, pipes, and similar items can be installed as shown without modifications to framing. Provide all blockouts, raceways

and similar framing, as required;

2. Coordinate the Work and not delegate responsibility for coordination to any Subcontractor. Contractor must make available to each Subcontractor, prior to the execution of each Subcontract, copies of the Contract Documents to which the Subcontractor will be bound. Subcontractor will similarly make copies of the Contract Documents available to their respective lower-tier Subcontractors. Contractor must provide Owner copies of the written agreements between Contractor and any Subcontractor upon request;
3. Anticipate interrelationship of all Subcontractors and their relationship with the total Work;
4. Resolve differences or disputes between Subcontractors and materials suppliers concerning coordination, interference, or extent of Work between sections;
5. Be in charge of and responsible for the Work and the Project site, including directing and scheduling all Work; and
6. Cooperate with Separate Contractors. Work by others may be occurring within the building or at locations adjacent or near to the Project site. Contractor must cooperate with all such work.

C. Mechanical and Electrical Coordination: Contractor shall:

1. Resolve all “tight”, restricted, or inaccessible areas involving Work of various disciplines in advance of installation.
2. If necessary, and before Work proceeds in these areas, prepare coordination drawings for review showing all Work in “tight”, restricted, or inaccessible areas.
3. Provide coordination drawings necessary to resolve “tight”, restricted, or inaccessible areas, at no increase in Contract Sum.

D. Job Site Field Measurements and Templates: Contractor shall:

1. Obtain field measurements required for accurate fabrication and installation of Work. Exact measurements are Contractor’s responsibility.
2. Furnish or obtain templates, patterns, and setting instructions as required for installation of all Work. Contractor shall verify in field, as needed.

END OF SECTION 01 31 23

PART 1 GENERAL

1.01 SUMMARY

A. This Section specifies the administrative and procedural requirements to comply with the requirements of the General Conditions regarding preparation of Contractor's Progress Schedules, monthly update to the Progress Schedules, and other schedules as specified herein. The purposes of these schedules and reports are to:

1. Ensure adequate planning and execution of the Work by Contractor;
2. Establish a standard against which progress of the Work can be tracked;
3. Assist in monitoring progress;
4. Evaluate the impact of any changes to the Contract; and
5. Support the basis for progress payments.

B. All schedule submittals including updated Progress Schedules will be reviewed by Owner for compliance with Contract terms and the needs of the University. Review of any schedule does not constitute approval or acceptance of Contractor's construction means, methods, or sequencing, or an assessment by Owner of Contractor's ability to complete the Work within the Contract Time.

1.02 WORK INCLUDED

A. Contractor shall submit a preliminary Progress Schedule, as required by the Pre-Construction Submittal Requirements of Section 01 33 00.

B. Contractor shall prepare and submit Progress Schedules and reports as required by this Section. NOTE: Processing and payment of the second Application for Payment is contingent upon receipt, review, and subsequent acceptance of the updated Progress Schedule.

C. Contractor shall participate in monthly scheduling meetings and provide updated Progress Schedules as require by this Section.

D. Contractor shall perform Contemporaneous Period Analysis (CPA) of any delays associated with the critical path schedule as required by this Section.

E. Contractor shall provide weekly Short-Interval (look-ahead) schedules as required by this Section.

F. Contractor shall submit a Submittal Schedule as required by this Section.

1.03 PRELIMINARY PROGRESS SCHEDULE

A. Contractor shall submit a preliminary Progress Schedule as part of the Pre-

Construction Submittal Requirements in Section 01 33 00 - Submittals. The schedule shall include activity description, activity start and end dates. The schedule shall emphasize milestone dates and date of Substantial Completion. Schedule shall clearly identify the critical path schedule elements.

B. Progress Schedule shall be in Bar Chart format.

C. Schedule activities longer than 14 days shall be sufficiently detailed.

D. Participate in schedule update meetings and provide updated Progress Schedules.

1.04 CONTRACTOR'S PROGRESS SCHEDULE

A. Within three calendar days of receiving WSU comments on the preliminary Progress (Bar Chart) Schedule, the Contractor shall prepare and submit a detailed Progress (Bar Chart) Schedule. This schedule shall be the Contractor's as-planned schedule and shall be used to plan, organize, and execute the Work, record and report actual performance and progress through updates, as well as show how the Contractor plans to complete all remaining Work. The accepted Contractor's Progress (Bar Chart) Schedule and subsequent updates shall be the basis for consideration and analysis of requests for time extensions.

B. Updates:

1. The Contractor is required to prepare and submit an updated Progress (Bar Chart) Schedule as agreed upon at the Pre-construction Meeting.

2. The Contractor and Owner’s Designated Representative will review the updated schedule and will discuss any differences or issues raised. Decisions made and agreed to by all parties are binding. However, no contracted completion dates will be modified except by an approved Contract Change Proposal and subsequent Change Order.

3. Timely submission of updates is of significant and crucial importance to the management of this Project. Lack of or late receipt of updates diminishes their value to the Project. Therefore, at the Owner’s Designated Representative discretion, partial payment may be withheld for a late update as may be determined by the Owner’s Designated Representative in consideration of the value of the update at the time of receipt, the circumstances of the late submittal, and the level of progress achieved on the Project.

C. The Contractor shall submit the Progress Schedule, consisting of the reports and diagrams as specified by this subsection, in the following formats quantities:

1. Electronic PDF file of all reports, schedules, etc.

2. Native electronic copy of the CPM Progress Schedule.

D. Float: Contractor is not entitled to any adjustment in the Contract Time or the Contract Sum, or to any additional payment or equitable adjustment of any sort,

by reason of the loss or the use of any float time, including time between Contractor's anticipated completion date and the end of the Contract Time, whether or not the float time is described as such on the Progress Schedule.

E. Qualifications: Contractor shall submit the resume(s) of the person(s) designated as responsible for schedules and reports (the Contractor's scheduler) Prior to commencing construction activities. Contractor's scheduler shall have demonstrable capability to plan, coordinate, execute, and monitor a CPM schedule as required for this Project. Owner's Designated Representative will approve or disapprove the Contractor's proposed scheduler. In the event of disapproval, a new scheduler shall be proposed within 7 Days and be subject to the same consideration criteria as noted above.

1.05 MONTHLY UPDATES

A. Contractor shall prepare and submit updated Progress Schedules and participate in schedule update meetings with the Owner each month. Participation in the meeting and submission of the monthly update is a condition precedent for payment of the line item value for scheduling Work.

1. Updated monthly schedule submittals:

a. A PDF electronic version of complete Project schedule showing the critical path accompanied by a narrative of any deviations from the previous month.
b. Electronic schedule file in native format.
c. Short-interval schedules or look-ahead schedules shall not be an acceptable submittal.

B. Contractor shall prepare an update of the current Progress Schedule each month to reflect Work progress achieved since the previous update. Progress updating shall be performed without changes to the schedule logic or the original duration of activities. Monthly progress updating is required and necessary prior to performing a Contemporaneous Period Analysis of any change to the calculated completion date from the prior update.

C. Contractor may, in a second report, incorporate any logic and duration changes that represent revised planning. All such changes must be clearly identified and submitted for acceptance.

D. The Progress Schedule must clearly identify the current Substantial and Final Completion dates.

E. Contractor shall account for all adverse weather days and similar excusable noncompensable delays. By whatever method Contractor chooses to account for such delays and events, a narrative description and CPA of the accounting shall be included with the narrative report.

F. Monthly schedule update meetings:

1. Monthly schedule update meetings shall be held at Contractor's Project field office one week prior to the due date of Contractor's monthly Application for Payment, unless otherwise agreed.
2. The Contractor shall provide updated Project schedule submittals.
3. The Contractor shall also provide a narrative report including:
   a. A description of the Work accomplished during the preceding period;
   b. A discussion of the Work that had been scheduled to be performed during the previous period but was not, and explain why it was not performed; and
   c. A discussion of the Work scheduled for the upcoming period noting any issues or events that could impact this Work. If Contractor intends to make logic or original activity duration changes, the report must specifically identify such changes.
4. Contractor, Owner, and Architect/Engineer will review these reports and will discuss any differences or issues raised. No contractual completion dates will be modified except by approved Change Order.

G. Timely submission of updates is of significant and crucial importance to the Project. Owner may withhold payment as per Section 01 29 00 Applications for Payment.

1.06 THE CONTEMPORANEOUS PERIOD ANALYSIS

A. It is Owner's intent to resolve all issues affecting the Contract completion date in a timely, efficient and effective manner. To achieve this goal, and in addition to contractor's obligation to follow the contractual dispute resolution procedure, Contractor shall analyze any delays to the critical path or completion date by application of the Contemporaneous Period Analysis method. A CPA shall normally coincide with the monthly schedule update meetings.

B. Assessment of impacts due to changes or other events, in accordance with the CPA method, must be based on the most recent accepted updated Progress Schedule. No logic or duration changes shall be made to updates until progress related data has been incorporated into the Progress Schedule and the Progress Schedule is updated to reflect actual progress for the period. All data shall be provided to Owner.

C. Submission of an accurate and properly updated Progress Schedule and completion of the Contemporaneous Period Analysis are conditions precedent to the review and approval of any request for an extension in the Contract Time. Owner may assess liquidated damages, if any, regardless of the status of any requests for time extensions pending, until any such requests are resolved.

D. The process for preparing and submitting a CPA is as follows:

1. Contractor will notify Owner in writing of event(s) or occurrence(s) which

constitute a delay of the critical path or completion date affecting progress of the Work.

2. Contractor shall evaluate the event(s) or occurrence(s) and produce a narrative of the resulting delay describing the effect upon concurrent or logically connected subsequent activities.

3. Consistent with the narrative, Contractor shall produce a subnet to graphically describe the event(s) or occurrence(s) and the effect upon the Progress Schedule.

4. Contractor will recalculate the Progress Schedule and provide an updated PDF and Native Progress Schedule.

E. The CPA will be reviewed at the monthly schedule update meeting or at a special meeting scheduled with Owner. At the CPA review meeting, Contractor shall present the CPA and respond to questions.

F. Until and unless substantiated delay is accepted by Owner, the time effect shall not be incorporated into any monthly update. If accepted after a monthly update in which the event(s) or occurrence(s) took place, that monthly update may be recalculated, resubmitted and shall be included in an approved Change Order.

1.07 SHORT-INTERVAL SCHEDULE

A. Prepare a weekly Short-Interval (look-ahead) Schedule based upon the Contractor's Work plan and the updated Progress Schedule.

B. Format for the Short-Interval (look-ahead) Schedule shall be acceptable to Owner. The format shall include comment annotation as necessary.

C. Content of the Short-Interval (look-ahead) Schedule shall include the Work planned for the next 3-week period and the Work that was performed in the previous week.

D. Copies of the Short-Interval (look-ahead) Schedule shall be provided at the weekly progress meetings to be used as a basis for discussion of progress and of planned Work.

1.08 SUBMITTAL SCHEDULE

A. Provide a Submittal Schedule within 10 Days of Owner’s Acceptance of the Project Schedule per Section 01 33 00 - Submittals.

PART 2 PRODUCTS

2.01 SCHEDULING SOFTWARE

A. Contractor shall utilize Microsoft Project or Primavera P6 unless otherwise agreed to by Owner.

B. Contractor shall provide a licensed and royalty pre-paid copy of the mutually agreed upon scheduling software. The selected software must be capable of performing target-to-current schedule comparisons, cost and resource loading functions and have the option of executing calculations in retained logic. Activities must be able to process lead and lag time relationships, start-to-finish or finish-to-finish relationships, and be capable of being hammocked, if required. The software must be registered with Owner and be provided in a format compatible with Owner's systems.

END OF SECTION 01 32 13

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Preconstruction photography.

B. Construction photography of Work-in-progress.

1.02 GENERAL

A. Contractor shall provide photographs taken from locations coordinated with Owner.

B. Photographer: Experienced in taking construction photography.

C. Equipment: All photos shall be in digital format.

D. Video images may be acceptable for certain operations. Confirm with Owner.

PART 2 PRODUCTS

2.01 PRECONSTRUCTION PHOTOGRAPHS

A. Contractor shall provide electronic files containing photographs of the existing conditions at the site, surroundings, and haul routes per the Pre-Construction Submittal Requirements of Section 01 33 00. Coordinate with Owner the extent of the preconstruction photographic record that is required.

2.02 CONSTRUCTION PHOTOGRAPHS

A. Contractor shall provide electronic files containing photographs of construction progress on a monthly basis.

2.03 PHOTOGRAPHIC SUBMITTALS

A. Photographs shall be submitted each month during the Contract Time, or as otherwise agreed upon by Owner. The number of photographs shall be sufficient to document the site to the satisfaction of the Owner and Contractor.

B. Photographs shall be representative of Project progress, showing all major Work and any critical concealed conditions.

C. The files in each monthly photograph submittal must each be labeled with the Project name, Project number, and submittal date. Additionally, each photograph shall be dated, labeled, and accompanied by a brief description identifying the location and direction the photo was taken. Date stamp using month/date/year format.

PART 3 EXECUTION

3.01 PRECONSTRUCTION PHOTOGRAPHS

A. Coordinate the scope of preconstruction photographic record survey with Owner.

B. Take preconstruction photographs to identify and establish a baseline record of existing conditions.

C. A preconstruction photographic record survey shall include, but not be limited to, all areas that may be impacted or damaged by construction phase activities.

D. The extent or nature of the existing site and adjacent surroundings shall be thoroughly documented.

3.02 CONSTRUCTION PHOTOGRAPHS

A. Contractor shall take construction photographs each month during construction of the Project.

B. Contractor shall document concealed conditions (once exposed) that differ from expectations.

1. It is critical that Contractor photographically document concealed conditions that may benefit Owner's future maintenance and operations activities. Take photographs (with a reference point) prior to cover or concealment. For example:
    a. Underground pipe arrangements/valves/structures.
    b. Under-slab utility rough-in.
    c. Wall cavity utility routing.
    d. Above-ceiling installation after ceiling support system installed, but prior to cover.
2. The photograph record described above shall be considered minimum and shall not be deemed to limit the quantity or quality of the photographic record.

END OF SECTION 01 32 33

PART 1 GENERAL

1.01 SUMMARY

A. This section includes administrative and procedural requirements for submittals required for performance of the Work, including:

1. Pre-Construction Submittal Requirements;
2. Shop Drawings;
3. Product data;
4. Samples; and
5. Mock-ups.

1.02 SUBMITTAL PROCEDURES

A. Provide submittal schedule as required by Section 01 32 13 – Progress Schedule. The Submittal Schedule shall meet all of the requirements below.

B. Coordination: Review of the submittals by Owner is not for the purpose of determining their accuracy and/or completeness, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of Contractor as required by the Contract Documents.

1. Owner reserves the right to withhold action on a submittal requiring coordination with other submittals until all related submittals are provided.
2. Allow at least 14 Days for review of each submittal by Owner. Complex or interrelated submittals, or the submission of multiple submittals at or near the same time, will require additional time. Provide a "priority list" when submitting multiple submittals at or near the same time. Submittal sequencing should coincide with the submittal schedule (see Section 01 32 13 – Progress Schedule).

C. Submittal Preparation: Place a permanent label or title block on each submittal for identification.

1. Include the following information on the label or title block:
    a. Project name, Project number, and date;
    b. Name and address of Owner;
    c. Name and address of Contractor and submitting Subcontractor, if applicable;
    d. Name and address of supplier and manufacturer, if applicable;
    e. Number and title of appropriate Specification section; and
    f. Drawing number and detail references, as appropriate.

2. Provide adequate space for action stamps to record review.

D. Submittal Transmittal: Package submittals in manageable quantities and transmit to Owner and Architect/Engineer, if applicable, simultaneously. Submittals received from sources other than Contractor will be returned without action. By submitting submittals, Contractor represents to Owner that 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 each submittal with the requirements of the Work and of the Contract Documents.

1. Address one topic or related set of topics in each transmittal based upon Specification sections (i.e., mechanical items should not be submitted under same transmittal with electrical items).
2. Clearly call out relevant information, deviations, and requests for data, including minor variations from the Contract Documents on both the transmittal and all copies of a submittal.
3. Shop drawings, product data, samples, and mock-ups shall be submitted to Owner's Designated Representative for review/approval. The minimum number of submittals to be provided are:
    a. Pre-Construction, Shop Drawings, Product Data: Electronic copies.
    b. Samples: As required by the technical Specification section.
    c. Mock-ups: As required by the technical Specification section.
    d. Demonstrations: As required to facilitate installation and inspection.
    e. Reference technical Specifications for additional submittal requirements.
4. Owner may modify the required submittal quantities.

E. Material and Color Submittal: Submit samples of actual colors and/or materials.

F. Number submittals by Specification section number and revision letter.

G. In the event of the need to "revise and resubmit" a submittal, resubmit same in acceptable form/content, clearly identifying deviations from the previous rejected submittal. Contractor shall also keep accurate records of the receipt, review, and delivery of all submittals and shall submit to Owner, as requested, status reports.

H. Provide a final electronic copy of all approved submittals.

1.03 PRE-CONSTRUCTION SUBMITTAL REQUIREMENTS

A. All Pre-Construction Submittals are required before onsite construction activities may commence. Contractor shall submit the following Pre-

Construction Submittals within 30 days of Notice to Proceed. Submittal review for these items only shall be supplied within 15 days of receipt by Owner.

1. Indoor Air Quality Management Plan
2. Site Safety and Health Plan (for information only)
3. Quality Control / Quality Assurance Plan
4. Waste Management Plan
5. Progress Schedule
6. Schedule of Values
7. Pre-Construction Photographs
8. Emergency Points of Contact
9. List of Subs and Suppliers
10. Demolition Plan
11. Asbestos Safety Plan
12. Traffic Control Plan
13. List of Long Lead Items

1.04 SHOP DRAWINGS

A. Submit Shop Drawings drawn to accurate scale. Do not reproduce Contract Documents or copy standard information for use as Shop Drawings. Standard information prepared without specific references to the Project will not be accepted as a Shop Drawing.

B. Shop Drawings Include: fabrication and installation drawings, setting diagrams, schedules, patterns, templates, and similar drawings. Include the following information:

1. Dimensions;
2. Products and materials;
3. Compliance with specified standards;
4. Coordination requirements;
5. Notation of dimensions established by field measurements;
6. Any deviation from Drawings or Specifications; and
7. Date when review is requested to maintain Progress Schedule.

C. Coordination Drawings:

1. Contractor and Subcontractors shall prepare and submit coordinated Shop Drawings at a scale not less than 1/4" = 1'0". Clearly show how the Work is to be installed or constructed in relation to the Work of other Subcontractors. Required coordinated Shop Drawings shall include but not be limited to the following:

    a. Contractor shall prepare a drawing indicating the reflected ceiling plan, beam soffit elevation, ceiling heights, roof openings, and

other items to be installed.

b. HVAC and controls Subcontractors shall prepare drawings indicating location, size, and elevation of ductwork, hangers, seismic bracing, grilles, registers, equipment, access (clear) areas to service equipment, and ceiling access doors.

c. Plumbing Subcontractor shall prepare drawings indicating location and elevation of piping, hangers, seismic bracing, valves, cleanouts, access doors, fixtures, and required access (clear) areas for service of fixtures.

d. Fire sprinkler Subcontractor shall prepare drawings indicating the layout of the complete sprinkler system including hangers, seismic bracing locations, and pipe runs including branch lines and riser diagrams. Indicate on a separate ceiling plan the location of sprinkler heads.

e. Electrical Subcontractor and fire alarm Subcontractor shall prepare drawings indicating the layout of fixtures, conduit runs 2" in diameter or greater, clearances, pull boxes, junction boxes, sound system speakers, cable trays and hangers, electrical equipment, panels, and access areas for equipment and panels.

2. Contractor shall meet with its Subcontractors to resolve any apparent conflicts in the coordinated Shop Drawings.

3. When these drawings have been coordinated to the satisfaction of Contractor and each applicable Subcontractor, Contractor and the applicable Subcontractor will sign and date a certification indicating that:

   a. all related conditions have been reviewed;

   b. no apparent conflicts exist;

   c. the requirements of the Contract Documents have been complied with; and

   d. all elements of a complete installation are included.

4. Maintain and submit all coordinated Shop Drawings as part of the Project Record (see Section 01 78 39 – Project Record).

5. Owner encourages Contractor to conduct its coordination effort through the use of digital models and Building Information Modeling (BIM) technology. If Owner requests, Contractor must produce submittals acceptable to Owner, but the submittals must satisfy the requirements identified above.

1.05 PRODUCT DATA

A. Product data includes: Manufacturer's printed installation instructions, catalog cuts, standard color charts, rough-in diagrams and templates, standard wiring diagrams, and performance curves.

   1. Where product data must be specially prepared because standard

printed data is not suitable, the submittal must be provided as a Shop Drawing.

B. Requirements: Mark each copy to show applicable options. Include the following information:

1. Manufacturer's printed recommendations;
2. Compliance with recognized trade-association standards;
3. Compliance with recognized testing-agency standards;
4. Application of testing-agency labels and seals;
5. Notation of dimensions verified by field measurement;
6. Notation of coordination requirements;
7. Any deviation from Drawings or Specifications; and
8. Date when review requested to maintain Progress Schedule.

1.06 SAMPLES AND MOCK-UPS

A. Submit samples and mock-ups that are identical to the material or product proposed. Samples include partial sections of components, cuts or containers of materials, color range sets, and swatches showing color, texture and pattern.

1. Package samples to facilitate review. Include the following:
   a. Generic description of the sample;
   b. Source;
   c. Product name or name of manufacturer;
   d. Compliance with recognized standards;
   e. Availability and delivery time; and
   f. Specification section.

B. Requirements: Submit samples and mock-ups for review of kind, color, pattern, and texture for a comparison of these characteristics before actual installation.

1. Where variation in color, pattern, texture or other characteristics are inherent in the material, submit not less than four units to show limits of variation.

C. Submittals: Where samples are for selection of appearance from a range of standard choices, submit a full set of choices for the material or products.

D. Maintain sets of approved samples and mock-ups at the Project site for quality comparisons throughout the course of construction.

E. Demolish and remove all samples and mock-ups prior to Substantial Completion but not sooner than directed by Owner.

1.07 OWNER's ACTION

A. Review: Except for submittals for information or a similar purpose, Owner will review each submittal, mark to indicate action taken, and return promptly.

B. Owner approval of submittals does not supersede or alter Contract Document requirements.

END OF SECTION 01 33 00

PART 1 GENERAL

1.01 SUMMARY

A. This Section includes the administrative and procedural requirements for any general alterations to be performed during the Project, including but not limited to products, transition and adjustments, cutting, patching, and repair and cleaning.

1.02 SUBMITTALS

A. Contractor shall submit a written request in advance of cutting or alteration that impacts:

1. Structural integrity of any element of Project.
2. Integrity of weather-exposed or moisture-resistant elements.
3. Efficiency, maintenance, or safety of any operational elements.
4. Visual qualities of sight exposed elements.
5. Work of Owner or a separate contractor.

B. Contractor must include in its written request, when required:

1. Identification of Project.
2. Location and description of affected Work.
3. Necessity for cutting or alteration.
4. Description of proposed Work and products to be used.
5. Alternatives to cutting and patching.
6. Effect on Work of Owner or separate contractor.
7. Written permission of affected separate contractor.
8. Date and time Work will be executed.

1.03 QUALITY ASSURANCE

A. Limits of Work:

1. Contractor shall maintain existing building structure (including structural floor and roof decking) and envelope (exterior skin and framing, excluding window assemblies and nonstructural roofing material) not indicated to be removed; do not cut such existing conditions beyond indicated limits.
2. Contractor shall maintain existing interior nonstructural elements (interior walls, doors, floor coverings, and ceiling systems) not indicated to be removed; do not cut such existing conditions beyond indicated limits.
3. Contractor shall maintain existing nonshell, nonstructural components (walls, flooring, and ceilings) not indicated to be removed; do not cut such existing conditions beyond indicated limits.

B. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.

C. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Operating elements include the following:

1. Primary operational systems and equipment.
2. Air or smoke barriers.
3. Fire-suppression systems.
4. Mechanical systems piping and ducts.
5. Control systems.
6. Communication systems.
7. Conveying systems.
8. Electrical wiring systems.
9. All low voltage systems.
10. Operating systems of special construction in Division 13.
11. Other operating systems as appropriate.

D. Miscellaneous Elements: Do not cut and patch miscellaneous elements or related components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended that result in increased maintenance or decreased operational life or void of warranty, or could adversely affect safety. Miscellaneous elements include the following:

1. Water, moisture, or vapor barriers.
2. Firestopping or fire barriers.
3. Membranes and flashings.
4. Exterior curtain-wall construction.
5. Equipment supports.
6. Piping, ductwork, vessels, and equipment.
7. Noise and vibration-control elements and systems.
8. Other miscellaneous systems as appropriate.

E. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exterior conditions or in occupied spaces in a manner that would, in Owner's opinion, reduce the building's aesthetic qualities. Contractor shall remove and replace conditions that have been cut and patched in a visually unsatisfactory manner.

PART 2 PRODUCTS

2.01 PRODUCTS FOR PATCHING AND EXTENDING WORK

A. New Materials: Match existing products and Work when patching and extending Work.

B. Type and Quality of Existing Products: Determine by inspection and testing products where necessary; refer to existing Work as a standard.

PART 3 EXECUTION

3.01 EXAMINATION

A. Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents related to that portion of the Work, as well as other information available to Contractor, take field measurements, and inspect any existing conditions, including elements subject to damage or movement during cutting and patching.

B. After uncovering existing Work, inspect conditions affecting performance of Work.

C. By beginning any cutting or patching, Contractor represents and warrants its acceptance of existing conditions.

D. Contractor shall verify that demolition is complete and areas are ready for installation of new Work.

3.02 PREPARATION

A. Contractor shall cut, move, or remove items as necessary for access to alterations and renovation Work. Replace and restore at completion.

B. Contractor shall remove unsuitable material not marked for salvage, such as rotted wood, corroded metals, deteriorated masonry, concrete, and disturbed subgrade material. Replace materials as specified for finished Work.

C. Contractor shall remove debris and abandoned items from area and from concealed spaces.

D. Contractor shall prepare surface and remove surface finishes to provide for proper installation of new Work and finishes.

E. Contractor shall close openings in exterior surfaces to protect existing Work. Contractor shall insulate ductwork and piping to prevent moisture and condensation in exposed areas.

F. Contractor shall provide temporary supports to ensure structural integrity of the Work. Provide devices and methods to protect Work from damage.

3.03 PERFORMANCE

A. Contractor shall coordinate alterations and renovations to expedite completion of the Work.

B. Remove, cut, and patch Work in a manner to minimize damage. Provide a means of restoring products and finishes to their original or specified condition.

C. Refinish remaining existing surfaces in renovated rooms and spaces, to specified condition for each material, with a neat and clean transition to adjacent finishes.

D. In addition to specified replacement of equipment and fixtures, restore existing plumbing, heating, ventilation, air conditioning, and electrical systems to full original operational condition.

E. Install products as specified in individual sections.

F. Remove samples of installed Work for testing when requested.

G. Provide openings in the Work for penetration of mechanical and electrical Work.

H. Cut rigid materials using the appropriate equipment and tool. Pneumatic tools not allowed without prior approval.

1. Concrete Walls: Saw-cut walls using accurately located straight lines, unless directed otherwise. Minimize overcuts.
2. Masonry Walls: Saw-cut along mortar joints, cutting block uniformly in accurately located straight lines, unless otherwise directed. Remove all mortar adhering to edges. Overcuts not allowed.
3. Wood Framed Walls: Demolish plaster or gypsum wallboard, removing wall framing only as required. Cut wall finish materials in straight uniform lines.
4. Concrete Floors: Saw-cut floors and remove. Core drill as required.

I. Restore Work with new products in accordance with requirements of Contract Documents.

J. Fit Work to existing pipes, sleeves, ducts, conduit, and other penetrations through surfaces, while maintaining assemblies.

K. At penetrations of fire rated walls, partitions, ceilings, or floors, completely seal voids with firestopping material to full thickness of the penetrated element, while maintaining assemblies.

L. Cleaning: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.

END OF SECTION 01 35 16

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements pertaining to regulatory requirements.

B. List of regulatory requirements.

1.02 CONTRACTOR RESPONSIBILITY

A. Contractor is solely responsible for compliance with all codes, laws, or regulatory requirements.

B. Inspections performed or not performed by the City of Richland, Labor and Industries, Owner, Owner Designated Representative, or others who are under contract to Owner do not waive or change Contractor's obligations, nor do such inspections constitute approval or acceptance of portions of the Work.

1.03 CONTRACTOR REQUIREMENTS

A. Contractor shall perform the Work in accordance with the requirements of governing agencies and applicable regulatory requirements, including those included in this Section and elsewhere in the Contract Documents. Contractor must comply with all applicable laws, building codes, regulations, and rules, including, when applicable, the Washington State University campus code.

B. Contractor shall schedule and coordinate inspections and gain approvals required by the City of Richland and other governing agencies in a timely manner and as required for Owner occupancy of the Project within the Contract Time.

C. Contractor shall inform the City of Richland Building and Fire Departments, Labor and Industries, and other governing agencies of changes in the Work affecting regulatory requirements in a timely manner.

D. Contractor shall promptly forward to Owner all inspection reports, orders, permits, and other directives and correspondence received from the City of Richland inspectors or other governing agencies having jurisdiction over the Work.

E. Contractor shall promptly notify Owner when the Contract Documents appear to be in conflict with Regulatory Requirements.

F. Contractor shall, at all times, use its best efforts and exercise its judgment as an experienced contractor to adopt and implement policies and practices designed to avoid work stoppages, slowdowns, disputes, or strikes where reasonably possible and practical under the circumstances, and shall, at all times, maintain Project-wide labor harmony.

1.04 REGULATORY REQUIREMENTS

A. Authority Having Jurisdiction (AHJ) shall be the organization, office, or individual responsible for enforcing the requirements of the applicable code(s) or standard(s), and or for approving equipment, materials, installation(s), or procedure(s).

B. Regulatory authorities establish minimum requirement levels. Where provisions of the Contract Documents and regulatory requirements differ or conflict, the more stringent requirement governs.

C. Regulatory requirements added by other sections of the Contract Documents or otherwise applicable are binding upon the Work in accordance with the provisions of this Section. The regulatory-requirements list provided below is intended to assist Contractor in determining the regulatory requirements for the Project, but neither the inclusion nor omission of any item from the list shall be construed to relieve Contractor of obligations that otherwise exist under the law or the Contract.

1.05 LIST OF REGULATORY REQUIREMENTS

A. International Building Code (IBC), current adopted edition.

B. International Fire Code (IFC), current adopted edition.

C. National Fire Protection Association (NFPA) Codes.

D. American Society of Mechanical Engineers (ASME), ASME A17.1 Safety Code for Elevators and Escalators, current adopted edition.

E. American Society of Mechanical Engineers (ASME), ASME A18.1 Safety Standard for Platform Lifts and Stairway Chairlifts, current adopted edition.

F. State of Washington, WAC-51-50-1101, Accessibility, as adopted by the State of Washington.

G. International Code Council (ICC)/American National Standards Institute (ANSI) A117.1 Accessible and Usable Buildings and Facilities, current adopted edition.

H. State of Washington, WAC Chapters 173, 246, and 296, as applicable.

I. U.S. Environmental Protection Agency 40 CFR, as applicable.

J. U.S. Transportation Department Title 49, Parts Pertaining to Transportation of Hazardous Materials.

K. U.S. Nuclear Regulatory Commission Title 10, Parts Pertaining To Radioactive Materials Management.

L. Washington State Ventilation and Indoor Air Quality Code, WAC 51-13.

M. Washington State Energy Code, WAC 51-11C. Shortened

N. Mechanical Work: International Mechanical Code (IMC), current adopted edition.

O. Plumbing Work: Uniform Plumbing Code (UPC) as amended and adopted by the State of Washington, in the Washington Administrative Code (WAC).

P. Federal Emergency Management Agency (FEMA) requirements for floodway/floodplain development.

Q. Electrical Work:

1. NFPA 70, National Electrical Code (NEC), most recent adopted edition.
2. Underwriters' Laboratories (UL).
3. National Electrical Manufacturer's Association (NEMA).
4. National Electric Safety Code (NESC).

1.06 PERMITS REQUIRED

A. Contractor shall obtain and pay for all required building permits, including any renewals. Contractor shall identify costs for permits on the Schedule of Values for permits obtained.

B. All trade permits (e.g. electrical, pressure vessel, elevator, etc.) must be included in each Subcontractor bid.

C. Owner obtains permits for the following facilities and activities.

1. U.S. Army Corps of Engineers:
   a. Wetlands (404).
2. Permits and/or Approvals from the DOE or local environmental authority:
   a. Stormwater from Construction Sites (Notice of Intent).
   b. Wastewater Discharge Facilities.
   c. Well Construction (including Well Abandonment).
   d. Water Rights.
   e. Notice of Construction (Air Pollution Sources).
   f. SEPA.
   g. Floodway/Floodplain development.

END OF SECTION 01 41 00

PART 1 GENERAL

1.01 SUMMARY

A. Conduct portions of the Work requiring special procedures due to hazardous materials and conditions in accordance with regulatory standards and guidance provided in this Section.

1.02 SUBMITTALS

A. Contractor shall deliver a current copy of its site specific Health and Safety Plan to the Owner per the Pre-Construction Submittal Requirements of Section 01 33 00. The submittal must include each Subcontractor's site specific Health and Safety Plan. Submittal to Owner is for information only, not for review, acceptance, or approval of the Health and Safety Plan, nor for analysis of content or completeness.

1.03 QUALIFICATIONS OF HEALTH AND SAFETY PERSONNEL

A. Contractor shall employ a competent person for each hazardous construction task in accordance with the requirements of WAC 296-155.

B. Contractor shall submit to Owner the names of its employees performing duties as competent persons, as well as the names of Subcontractor employees performing duties as competent persons.

1.04 HAZARDOUS MATERIALS MANAGEMENT

A. Dangerous Waste Management:

1. Contractor agrees and acknowledges that:

   a. Contractor has direct and exclusive control over the Work and operations at the Project site and is responsible for any Contractor generated, created, or disturbed Washington State dangerous waste and its collection, labeling, accumulation, transportation, and disposal. Owner's EH&S department will provide assistance to Contractor upon request, and will coordinate transportation and disposal of Project-generated Washington State dangerous waste.

   b. Contractor must provide Owner immediate notification of any pre-existing unanticipated Washington State dangerous waste or site contamination.

2. Contractor is responsible for securing its own waste generator identification number, and Contractor shall sign all manifests associated with the Contractor-generated waste.

   a. Contractor shall obtain an EPA/State ID number in accordance with WAC 173-303-360 before conducting activities generating chemical waste designated as Washington State dangerous waste.

b. Contractor shall cancel the EPA/State ID number when:

1) All activities generating or managing waste have ceased;

2) All regulated wastes have been removed from the Project site under proper manifests, and all site contamination is remediated; and

3) All annual dangerous-waste reporting requirements are complete.

c. Contractor may call the Washington State Department of Ecology (DOE) to request a reporting package for early submittal.

d. Contractor shall furnish to Owner's EH&S Department, Pullman, WA, within 3 Days from submittal or receipt, copies of the following documents:

1) Form 2 Notification of Dangerous Waste Activities;

2) All signed Uniform Hazardous Waste Manifests (original copy when shipping wastes and copy returned from the treatment, storage, disposal, or recycling facility), Land Disposal Restriction Notification forms, Certificates of Recycling/Disposal/Destruction, and Exception Reports;

3) All Annual Reports; and

4) All correspondence from the DOE.

3. Owner remains responsible for Washington State dangerous waste and site contamination: (1) pre-existing Contractor's activities at the site, (2) not listed in the Contract Documents, and (3) not disturbed by Contractor through improper construction activities.

4. For waste identified in contract document and for unanticipated Washington State dangerous waste or site contamination discovered during the course of the Work on the site, Contractor shall:

a. Collect, containerize, and accumulate all Washington State dangerous waste or site contamination in accordance with applicable Federal, State, and local regulations.

b. Coordinate all transportation and disposal activities through Owner's EH&S department, who will utilize the Washington State Hazardous Waste Disposal Services contract or equivalent pre-approved contractor. Owner's disposal contractor shall complete all applicable dangerous waste shipping papers including all Uniform Hazardous Waste Manifests, Land Disposal Restriction Notification forms, profiles and barrel packing lists.

B. Hazardous Materials Spills and Releases:

1. Contractor and Subcontractor(s) shall immediately report all hazardous materials spills at the Project site to Owner. If a hazardous material spill occurs at a Project site in Whitman County, and if any individual may be affected by the spill, Contractor and/or Subcontractor(s) must immediately report the spill to Whitcom (emergency dispatch). In other counties,

Contractor and Subcontractor(s) must report spills to the appropriate emergency response agency in that area.

2. Contractor shall be responsible for spill containment, cleanup, decontamination, post-cleanup monitoring, disposal of any wastes generated from cleanup activities, and generation of any reports required by regulatory agencies and/or regulations including, but not limited to, WAC 173-303 and WAC 173-340.

C. Spill Prevention Control and Countermeasures:

1. Owner's EH&S department is responsible for Owner's SPCC Plan. Any of Contractor's on-site activities involving the handling and/or storage of materials meeting the definition of oil per 40 CFR 112 in containers and/or equipment with a capacity greater than 42 gallons must be included in the Owner's SPCC Plan. Contractor shall provide Owner's EH&S department with an inventory of this equipment or containers at least 14 Days prior to the equipment or containers being brought to the Project site.

2. Contractor shall provide and utilize secondary containment for containers and tanks of oil with a capacity greater than 42 gallons. Owner may waive this requirement in its sole discretion upon Contractor's request after Owner reviews Contractor's written explanation as to why secondary containment is unnecessary for a particular container or tank.

D. Asbestos:

1. All Contractor employees involved in excavation or demolition shall be asbestos awareness trained. Contractor shall submit to Owner the name of Contractor's competent trainer, the names of each of Contractor's trained personnel, and the date of each training. Contractor's submittal must also state that the training was conducted for asbestos awareness for the Work.

2. All asbestos abatement Work shall be performed by persons trained in Washington State-approved courses and certified by the State of Washington.

3. All asbestos abatement Work performed shall be overseen by a consultant hired by the Owner to ensure the Work meets regulatory standards and Owner requirements.

4. All asbestos cement pipe Work shall be performed by persons trained in an asbestos cement pipe procedures course whose content is reviewed and approved by the Washington State Department of Labor and Industries, per WAC 296-62-07722(3)(ii)(C).

5. If suspected asbestos-containing material is discovered during Contractor's execution of the Work, and abatement of the material is not a requirement of the Contract, Contractor shall suspend any Work that affects the material and immediately notify Owner. Contractor shall safeguard the area to prevent entry until certified personnel determine whether the material is non-asbestos containing or the material is abated, at which time the Work in that area may resume.

E. Lead:

1. Owner shall inform Contractor of lead-containing coatings and materials that the Contractor may encounter while performing the Work. These materials or coatings may release lead into the air, soil, or water, or may be a source of contamination due to skin contact. Owner shall provide general data about the percentage of lead content of each suspected lead-containing material or coating and/or provide Contractor with data showing the amount of lead per surface area.
2. Contractor is responsible for protecting its employees from lead exposure, as required by Washington law.
3. Contractor shall manage all paint chips, building components, soil, and/or other material considered by Owner to be dangerous waste according to the Dangerous Waste Management paragraph.

F. Polychlorinated Biphenyls:

1. Owner may survey oil-filled equipment prior to commencement of construction. This equipment includes, but is not limited to, transformers, electrical switches, hydraulic elevators, emergency generators, capacitors and light ballasts. Owner's survey shall usually determine if the equipment is filled with oil containing polychlorinated biphenyl (PCB). Owner shall remove, or arrange for the removal of, any equipment that contains oil in concentrations qualifying the equipment as dangerous waste per WAC 173-303.
2. If oil-filled equipment is discovered during Contractor's execution of the Work, Contractor shall suspend any Work that may affect the equipment and immediately notify Owner. Owner shall test the equipment and determine the appropriate management method for the equipment and the oil it contains.

G. Mercury:

1. Owner may survey all equipment suspected of containing mercury prior to commencement of construction. This equipment includes, but is not limited to, switches and thermostats. Owner's survey shall determine if the equipment contains mercury. Owner shall remove, or arrange for the removal of, any such equipment.
2. If mercury-containing equipment is discovered during Contractor's execution of the Work, Contractor shall suspend any Work that may affect the equipment and immediately notify Owner. Owner shall test the equipment and determine the appropriate management method for the equipment and the mercury it contains.

H. Hazardous Materials or Equipment:

1. Fixed equipment such as fume hoods, safety cabinets, and vacuum systems, and related ductwork, fans, and appurtenances, may contain or

be contaminated with hazardous materials. Owner may test this equipment to determine what, if any, hazards are present. If equipment contains a hazard, or if the equipment itself is a dangerous waste, Owner shall inform Contractor of the nature of the hazard including any information necessary for Contractor to protect its workers. If the equipment is a dangerous waste, Contractor shall dispose of, or make arrangements for the disposal of, the equipment per the above Dangerous Waste Management paragraph.

I. Underground Storage Tanks (USTs):

1. Removal of USTs shall be performed in accordance with DOE regulations. Removal of existing USTs shall be performed by a DOE-certified UST removal company following the submittal of required forms. Copies of forms must be provided to Owner's EH&S department at the same time they are submitted to DOE.
2. Installation of any UST must be done by DOE-certified UST installers. The installation shall be permitted by DOE following the submittal of completed UST installation forms. Copies of forms must be provided to Owner at the same time they are submitted to DOE.
3. Retrofits and upgrades of existing USTs must be completed by DOE certified companies. Records of the retrofit or upgrade must be submitted to DOE following the retrofit or upgrade. Copies of such records must be provided to Owner at the same time they are submitted to DOE.
4. If a UST is discovered during Contractor's execution of the Work, Contractor shall suspend any Work that may affect the UST and immediately notify Owner. Owner will determine if UST must be sampled and/or removed. If necessary, Owner shall engage a certified company to remove UST.

J. Department of Homeland Security (DHS) Chemicals of Interest (COI)

1. Contractor and Subcontractors shall report any COI to Owner as required by the DHS. Contractor may contact Owner's Representative in conjunction with the University's EH&S Department for the specific means of reporting.

1.05 WATER AND STORMWATER POLLUTION PREVENTION:

A. Water Pollution:

1. Discharge of any pollutants (including sewage and chlorinated water from water line disinfection) into surface or ground waters of the Sate (including storm drains, ditches and any other water conveyances) is prohibited.
2. Contractor removal of snow, ice, soil, and mud from roadways and sidewalks shall be accomplished without polluting storm drains or surface waters. Mud and soil removal shall be undertaken on a full-time basis, not just once or twice a day. Soil or mud that is dropped onto streets and

sidewalks by vehicles at the Project site shall immediately be cleaned by Contractor. Contractor may not use water to clean streets and sidewalks. Under no circumstances may dust mitigation cause soil erosion or pollution of surface waters.

3. If a discharge to surface or ground waters does occur, Contractor shall immediately notify Owner.

B. Stormwater Pollution Prevention Plan (SWPPP):

1. For projects that disturb a soil surface area of one acre or greater:

a. Contractor shall prepare a written SWPPP that meets DOE regulations and the requirements of Owner's Municipal Stormwater Permit.

b. Owner shall apply for a DOE NPDES Construction Stormwater General Permit for stormwater discharge, and then transfer the permit to Contractor. Contractor shall comply with all provisions of the permit.

c. Contractor shall maintain a copy of the NPDES permit and the SWPPP on-site at all times.

d. Contractor shall maintain on-site or on call, at all times, a Certified Erosion and Sediment Control Lead (CESCL).

e. Contractor's SWPPP shall identify all management practices used to prevent stormwater pollution and the location(s) at which each practice will be utilized on the Project site.

f. Contractor shall obtain approval from Owner of the SWPPP prior to groundbreaking. Contractor shall construct approved BMP's and the site inspected and approved, per permit requirements, prior to groundbreaking.

g. Contractor shall use best management practices (BMPs) and shall inspect BMPs at least once a week. In addition, Contractor shall inspect BMPs immediately following each rainfall event of 0.1 inches or greater.

h. Contractor shall maintain a written log detailing the results of inspections beginning with the first day of construction. Contractor's written log shall describe all erosion control activities resulting from inspections. In addition, the following dates and events shall be included in the written log:

1) The beginning and completion of major grading activities.

2) Rainfall events of 0.1 inches or greater.

3) When construction activities temporarily or permanently cease on-site, or on a portion of the site.

4) When stabilization measures are initiated for portions of the site.

5) Stormwater sampling results.

i. Contractor shall maintain and/or repair all BMPs as necessary to ensure continued performance of their intended function. Contractor's maintenance and repair activities shall include, but are not limited to:

1) Removal of sediment from silt fences before it reaches approximately one third the height of the fence, especially if heavy rains are expected; and

2) Cleaning or removal and replacement of drain inlet protection devices at least once every 7 Days, and once daily during storm events or before 6 inches of sediment can accumulate.

j. Contractor shall remove all temporary erosion and sedimentation control measure from the Project site within 30 Days after final site stabilization is achieved, or after the temporary BMPs are no longer necessary. Contractor shall remove any trapped sediment from the Project site. Contractor shall permanently stabilize any areas of soil disturbed by sediment removal.

k. In addition to sediment control, Contractor shall prevent other pollutant discharges from contaminating stormwater, groundwater, or soils.

1) Any maintenance or repair of heavy equipment and vehicles involving oil changes, hydraulic system draining and removal, solvent and degreasing cleaning operations, fuel tank draining and removal, and other activities that may result in discharge or spillage of pollutants to the ground or into stormwater runoff must be conducted using spill prevention measures, such as drip pans. Contractor shall immediately clean any contaminated surfaces following any discharge or spill incident. Emergency repairs may be performed on-site using temporary plastic placed beneath and, if raining, over the vehicle.

2) Wheel wash or tire bath wastewater shall be discharged to a separate on-site treatment system.

3) Application of agricultural chemicals including fertilizers and pesticides shall be conducted in a manner and at application rates that will not result in loss of chemical to stormwater runoff. Manufacturers' recommendations for application rates and procedures shall be followed.

4) Use of lime, flyash, or other soil amendments that could alter the pH of discharge waters is prohibited.

5) Highly turbid or contaminated dewatering water from construction equipment operation shall be handled separately from stormwater. Management options include infiltration, transportation off-site for legal disposal, or use of a sedimentation bag with outfall to a ditch or swale for small volumes of localized dewatering.

l. Contractor shall provide to Owner all notifications/reports required by permit to DOE.

1) If stormwater sampling results show turbidity greater than or equal to 250 NTU, Contractor shall immediately report to DOE and shall notify Owner of the report.

2) Contractor shall file monthly Discharge Monitoring Reports (DMR's) with DOE as required. Contractor shall provide copies of all DMR's to Owner.

2. For projects that disturb a soil surface area of 5,000 square feet or greater, but less than one acre, provisions shall be made to meet applicable local regulations, as necessary.

a. Contractor shall make provisions for inspection and approval by the local authority prior to groundbreaking.

3. For projects that create additional impervious surfaces, provisions shall be made to meet stormwater flow control and treatment requirements, as applicable.

C. Wetlands:

1. Contractor must follow all Federal, State and local regulations including but not limited to WAC 173-201 regarding protection of wetlands.

1.06 AIR POLLUTION

A. Contractor shall comply with all provisions of the Owner's Air Operating Permit, WAC 173-400 and WAC 173-401 requirements as applicable.

B. Contractor shall control pollutants, such as diesel emissions, chemical emissions, and dust generated by the Project, so that pollutants do not adversely impact the Project site or the surrounding-area air quality.

C. Contractor shall submit to Owner within 30 Days of the Notice to Proceed a list of any stationary air emission-generating equipment included in the Work, such as: fuel-powered electrical generators, internal combustion engines, boilers, paint booths, CFC-containing equipment, or other regulated emission sources. Contractor shall assist Owner in the preparation of necessary permit applications, and Owner shall obtain necessary permits. Contractor shall abide by any conditions or requirements of permits.

D. Per WAC 173-400, Contractor shall mitigate all fugitive emissions (such as dust, vehicle exhausts, and other emissions that do not pass through a stack, chimney, or vent) generated by the Work. Contractor shall mitigate dust at the Project site throughout the entire duration of the Work. Dust mitigation may include application of specific chemical compounds approved by Owner, or may be accomplished with intermittent watering and sprinkling at such a frequency as will satisfactorily settle dust (excluding paved surfaces). Paved surfaces shall be cleaned mechanically without the discharge of water or chemicals to storm drains

and/or surface waters. Under no circumstances shall Contractor permit dust mitigation cause soil erosion or pollution of surface waters.

E. No materials shall be burned without required permits. If permitted burning is done, odors shall be minimized in accordance with the Owner's Air Operating Permit.

F. CFCs (chlorofluorocarbons) or HCFCs (hydrochlorofluorocarbons) are not permitted as refrigerants in new or renovation projects. New permanently installed refrigeration equipment, such as chillers, temperature controlled chambers, air conditioning equipment, compressors, etc., must contain HFC (hydrofluorocarbon) refrigerants only (i.e., R-134A, R-404A, or R-507). At the completion of the Project, Contractor must provide detailed documentation to Owner about the refrigeration equipment installed, including identifying markings, capacity, and type of refrigerant. Refrigerant must be installed only by persons certified to do so.

G. Indoor Air Quality:

1. Owner shall notify Contractor of the location of fresh air supply intakes for buildings in the immediate area of the Work, and of fresh air supply intakes for buildings that may be affected by emissions from Contractor operations.
2. Contractor shall notify Owner 3 Days prior to commencing Work in which Contractor must operate vehicles or equipment in areas where fresh air supply intakes are located.
3. Contractor shall notify Owner 3 Days prior to commencing Work in which Contractor will be using solvents or other volatile chemicals, or processes which emit fumes, smoke, or strong odors that may affect fresh air supply intakes, or may enter Owner's buildings through doorways or windows.
4. Contractor shall not allow its activities that emit vapors, fumes, smoke or strong odors to negatively affect fresh air supply intakes.
5. If air releases of hazardous chemicals must occur, Contractor shall submit no later than 30 Days after the Notice to Proceed a chemical release plan detailing how such incidents may adversely affect Owner. Such a plan shall also specify protection to be provided to the employees of Owner and Contractor actions required to minimize chemical overexposure.
6. During welding activity, Contractor shall confine fumes to the Project site, and the fumes must not adversely affect Owner's employees or students.

1.07 PUBLIC HEALTH

A. Solid Waste Disposal:

1. Contractor shall legally dispose of or recycle all solid waste at an off-site location. Contractor shall not burn, dump, or bury waste materials, debris, or rubbish on Owner property. Contractor shall clean the Project

site at the end of each work shift. Contractor is liable for any and all damage resulting from improper waste handling and disposal (see Section 07 74 19 - Construction Waste Management).

B. Environmental Noise:

1. Per WAC 173-60, and applicable local requirements, Contractor shall not exceed maximum permissible environmental noise levels for the duration of the Work.

C. General Sanitation:

1. Per WAC 246-203, Contractor shall supply adequate water for drinking and hand washing purposes. The use of common drinking cups or towels is prohibited. For hand washing purposes, Contractor shall supply hot running water, soap, disposable towels, and a waste receptacle.

D. Drinking Water Protection:

1. Per WAC 246-290 and 246-291, Contractor shall protect all public water supplies. No portion of a public water system containing potable water shall be put into service nor shall service be resumed until the facility has been effectively disinfected and a satisfactory bacteriological sample has been obtained from a DOE-certified laboratory. Results of sampling shall be sent to Owner. The procedure used for disinfection shall conform to current standards of the American Water Works Association.
2. A minimum sanitary control area around all wells shall be maintained at all times. The sanitary control area shall extend at least 100 feet from any well. No source of contamination may be constructed, stored, disposed or applied within the sanitary control area.
3. If wells are being constructed or abandoned, Owner shall procure the appropriate water rights and construction permits per WAC 173-160. Owner shall provide copies of these documents to Contractor. Wells shall be constructed/abandoned properly by a licensed well driller. Contractor shall submit a plan to Owner detailing how all disinfection shall be accomplished.
4. Backflow Prevention:
    a. Any connection made by Contractor to Owner's drinking water system, including connection to a fire hydrant, must be made through a backflow prevention assembly approved by a Washington State certified cross connection control specialist (CCS) engaged by Owner and inspected and tested by a Washington State certified backflow assembly tester (BAT).
    b. Contractor shall label all non-potable water outlets, in a manner acceptable to the Owner, "Non-potable Water / Do Not Drink".

E. Vector Control: NOT USED

F. On-Site Sewage Disposal:

1. Contractor is responsible for fully complying with WAC 246-272. A construction permit application shall be submitted to the appropriate jurisdictional authority for approval. The jurisdictional authority shall issue a construction permit prior to the commencement of construction and shall perform pre-opening inspections. Contractor shall ensure that the appropriate authority inspects and approves the site prior to construction and when the project is substantially complete.

G. Water Recreation Facilities: NOT USED

H. Food Service Facilities: NOT USED

1.08 OCCUPATIONAL HAZARD MANAGEMENT

A. Chemical Hazard Communication:

1. If any hazardous chemicals will be used in the Work or present at the Project site, copies of applicable Material Safety Data Sheets (MSDS) shall be made immediately available to Owner prior to use by Contractor and during any use of the hazardous chemicals in the Work.

2. If the use or presence of hazardous chemicals at the Project site may affect the health of individuals outside the Project site, Contractor shall submit a written plan to Owner at least 30 Days prior to such use or presence detailing how Owner can avoid exposure to the products. Contractor shall submit MSDS / SDS to Owner for any hazardous chemical to which persons outside the project site may be exposed. The exposure avoidance plan shall also specify actions that should be taken if inadvertent exposure occurs. Owner shall provide Contractor with a written plan detailing how Contractor employees can avoid exposure to hazardous chemicals used by Owner that may impact the Project site, and shall specify actions which should be taken if inadvertent exposure occurs. Owner shall submit MSDS / SDS to Contractor for any hazardous chemical to which persons inside the project site may be exposed.

B. Lock-Out/Tag-Out:

1. When Owner and Contractor are to be engaged in coordinated activities requiring the control of hazardous energy, Owner and Contractor shall inform each other of their respective lock-out or tag-out procedures.

C. Confined Space:

1. When Contractor employees are to enter permit-required confined spaces, Owner shall:

a. Inform Contractor that the Project site contains permit required spaces and that permit-space entry is allowed only through compliance with a confined-space program meeting WAC 296-809.

b. Inform Contractor of hazards that have been identified.

c. Coordinate entry operations with Contractor when both Owner and Contractor personnel will be working in or near permit spaces.

d. Debrief Contractor at the conclusion of the entry operations regarding any hazards confronted or created in permit spaces during entry operations.

END OF SECTION 01 41 19

PART 1 GENERAL

1.01 SUMMARY

A. Contractor shall perform all Work in a skillful and workmanlike manner. Materials and equipment furnished by Contract and any Subcontractor(s) must be of good quality and new unless the Contract Documents require or permit otherwise. Materials shall conform to the manufacturer's standards in effect at the date of execution of the Contractor and shall be installed in accordance with the manufacturer's instructions, specifications, and directions. Contractor shall, if requested by Owner, furnish satisfactory evidence regarding the kind and quality of any materials identifying thereon the source, and warranting their quality and compliance with the Contract Documents.

B. Section includes:

1. Contractor's Quality Control Program;
2. Field samples;
3. Mock-ups;
4. Manufacturer's instructions;
5. Manufacturer's field services;
6. Testing laboratory services; and
7. Contractor tests and inspections.

1.02 QUALITY CONTROL PROGRAM SUBMITTALS

A. Contractor shall submit a written Quality Control Program for the Project per the Pre-Construction Submittal Requirements of Section 01 33 00. This submittal shall include but not be limited to the following:

1. An overview of Contractor's Quality Control Program.
2. Identification and resume of Contractor's on-site Quality Control Manager (QCM).
3. A description of the activities, record keeping, and correspondence that the QCM will perform and be accountable for throughout the duration of the Project.
4. A description of the quality control meetings to be conducted, sample inspection check lists (i.e., samples of actual inspection check list forms that will be submitted to Owner when scheduling inspections), and Subcontractors' quality control representatives. All forms that Contractor intends to use in its Quality Control Program shall be part of the submittal.
5. A description of the QCM activities when inspections fail to verify compliance with the Contract Documents.
    a. These activities are to include, as a minimum, follow-up with

applicable Subcontractors, correction and/or completion of Work required for re-inspection, and the re-inspection.

b. Contractor shall submit its weekly Non-Compliance Logs at least 2 Days prior to each Progress Meeting.

6. A description of the QCM activities to provide the required notifications for inspections.

7. A description of record keeping and information turn-over to Owner as a component of the Operating and Maintenance data (i.e. factory representative's start-up reports and permission to energize, verification of correct voltage and phasing to motors, etc.).

8. Contractor will submit a daily report within 3-business days for any day work is performed. The daily report should include the following information; the list may be adjusted or relaxed with Owners Representative approval depending on size and scope of the project requirements:
   a. progress photo's,
   b. list of contractor's and work-force #'s for each contractor,
   c. RFI's or questions,
   d. equipment quantities in use or idle,
   e. weather (if work is being performed outside),
   f. construction delays or likely delays,
   g. 3rd part inspections or city visits,
   h. safety issues,
   i. meetings conducted,
   j. substantive material deliveries, and
   k. any other relevant facts occurring on the site.

1.03 CONTRACTOR'S QUALITY CONTROL PROGRAM

A. Contractor shall establish and maintain a written Quality Control Program which shall be issued by Contractor to Subcontractors performing Work on the Project and utilized to verify that the execution of the Work is consistent with the requirements of the Contract Documents.

B. The Quality Control Program shall include, but not be limited to the following:

1. Preparatory Phase:

   a. Prior to beginning Work, after all required plans/documents/materials are approved/accepted, and after copies are at the work site. Contractor shall:

   b. Review of each paragraph of applicable specifications, reference codes, and standards. Make a copy of those sections of referenced codes and standards applicable to that portion of the work to be accomplished in the field at the preparatory inspection. Maintain these copies in the field, available for use by Owner's Designated Representative until final acceptance of the work.

c. Review the Drawings.

d. Check to assure that all materials and/or equipment have been tested, submitted, and approved.

e. Review provisions that have been made to provide required control inspection and testing.

f. Examine the work area to assure that all required preliminary work has been completed and is in compliance with the contract.

g. Perform a physical examination of required materials, equipment, and sample work to assure that they are on hand, conform to approved shop drawings or submitted data, and are properly stored.

h. Review appropriate accident safety procedures.

i. Discuss procedures for controlling quality of the work including repetitive deficiencies. Document construction tolerances and workmanship standards for that feature of work.

j. Check to ensure that the portion of the plan for the work to be performed has been accepted by the Owner's Designated Representative.

k. Schedule, manage and record the minutes of each preparatory meeting.

l. Review all RFIs associated with the Work.

2. Initial Phase:

a. At the beginning of the Work, Contractor shall:

b. Check work to ensure that it is in full compliance with contract requirements. Review minutes of the preparatory meeting.

c. Verify adequacy of controls to ensure full contract compliance. Verify required control inspection and testing. Resolve all differences and deficiencies.

d. Establish level of workmanship and verify that it meets minimum acceptable workmanship standards. Compare with required sample panels as appropriate.

e. Check safety to include compliance with and upgrading of the Safety Plan. Review with each worker. Particular attention should be given to high hazard work.

f. Prepare and attach to the daily CQC report separate minutes of this phase.

g. Repeat the initial phase any time acceptable specified quality standards are not being met.

3. Follow Up Phase:

a. Perform daily checks to assure control activities, including control testing, are providing continued compliance with contract

requirements, until completion of the Work. The checks shall be made a matter of record in the QC documentation. Conduct final follow-up checks and correct deficiencies prior to the start of additional features of work which may be affected by the deficient work. Do not build upon nor conceal non-conforming work.

C. Contractor's Quality Control Program shall be independent of any inspections and testing performed by Owner or by any independent testing and inspection agencies hired by Owner.

D. Within the Quality Control Program, Contractor shall have available on the jobsite at all times a written report of quality control activities. At a minimum, the report shall note Project site quality control inspections, performance of scheduled tests and follow-up testing, other required inspections, deficiency log, and examinations of workmanship and quality.

E. Test results shall identify applicable Contract (including Specification) requirements, the test or analysis procedures used, and the actual test results. A statement shall be included that the item tested or analyzed conforms or fails to conform to the Contract Documents. Each report shall be conspicuously stamped on the cover sheet "CONFORMS" or "DOES NOT CONFORM" as the case may be. All test reports shall be signed by a testing laboratory representative authorized to sign certified test reports. Copies of all test reports shall be available on the jobsite at all times.

F. If the Quality Control Program is found to be defective and Contractor does not promptly correct the deficiency, Owner may:

1. Withhold payment until satisfactory corrective action has been taken, or
2. Issue a stop work order until satisfactory corrective action has been taken.

G. Pre-Inspections: Contractor shall pre-inspect Work that requires normal, special, and additional inspections as indicated in the Contract Documents.

1.04 FIELD SAMPLES

A. Field samples are defined as the partial installation of selected materials at the Project site for Owner's review and acceptance of visual features and workmanship. Generally, accepted field samples are incorporated into the Work.

B. Contractor shall provide field samples as required by the Contract Documents at location acceptable to Owner.

C. Perform Work in accordance with the Contract Documents.

D. Approved samples will serve as an acceptable standard of quality and workmanship.

E. Maintain samples until completion of relevant Work.

F. Upon completion of relevant Work or when directed by Owner, demolish and remove samples from Project site unless sample is accepted as part of completed Work.

1.05 MOCK-UPS

A. Contractor shall provide mock-ups as required by the Contract Documents. Provide additional mock-ups, as required by Owner, until approval is obtained.

B. Do not proceed with subsequent Work until approval of the mock-up is obtained.

C. The approved mock-up shall be the standard of workmanship and materials for the Work that is represented by the mock-up.

D. Maintain mock-up in approved condition, until directed otherwise by Owner.

E. Unless specified otherwise, remove mock-up at completion of the Work or when directed by Owner.

F. Unless specified or approved otherwise, mock-ups shall be completed and approved prior to the pre-installation meeting at which the Work represented by the mock-up will be discussed.

G. Notify Owner a minimum of 7 Days prior to requesting mock-up approval.

1.06 MANUFACTURERS' INSTRUCTIONS

A. Contractor shall comply with manufacturers' instructions in full detail, including each step in sequence. Do not omit preparatory steps or installation procedures unless specifically modified or exempted by Contract Documents.

B. Should instructions conflict with Contract Documents, Contractor shall request clarification before proceeding.

1.07 MANUFACTURERS' FIELD SERVICES

A. When specified, Contractor must require product manufacturer to furnish a qualified representative to observe field conditions and quality of workmanship, and to provide recommendations, certifications, and other specified services.

B. Representative shall submit written report to Owner listing observations and recommendations.

1.08 TESTING LABORATORY SERVICES

A. Owner will arrange for services of an independent Testing Laboratory to inspect and test the Work to verify compliance with Contract Documents.

B. Contractor's Responsibilities:

1. Cooperate with Testing Laboratory personnel, and furnish access, tools, samples, certifications, test reports, design mixes, equipment, storage, and assistance as requested by the Testing Laboratory.
2. Notify Owner and Testing Laboratory a minimum of 7 Days in advance of all required tests and 48 hours in advance of all required inspections. When tests or inspections cannot be performed, through fault of Contractor, Contractor shall reimburse Owner for costs incurred by Owner.
3. Contractor shall remove and replace Work found to not comply with Contract Documents.
4. If initial tests and inspections indicate deficient work, Contractor shall reimburse Owner for costs of all subsequent tests and inspections related to such deficiency.
5. All damage to Work as a result of normal testing operations shall be repaired by Contractor to match surrounding surfaces.
6. Schedule testing and inspection so that work of testing and inspection personnel will be as continuous and brief as possible.
7. Contractor shall reimburse Owner for travel and lodging expenses incurred for testing and inspection services performed outside a radius of 100 miles of the Project site.

1.09 CONTRACTOR TESTS AND INSPECTIONS

A. Inspection and testing performed exclusively for Contractor's convenience shall be the Contractor's sole responsibility.

B. Earthwork Compaction Testing Requirements:

1. Owner will engage the services of a Testing Laboratory to perform all soil and structural fill compaction testing. Compactions of any fill material shall be equal to or exceed the specified percentage of maximum dry density as defined by ASTM test procedure D1557 (modified proctor). Obtaining such specified compaction performance is the sole responsibility of Contractor.
2. During any of Contractor's operations, Owner reserves the right to perform compaction tests for its own information only. At Owner's discretion, copies of such tests may be made available to Contractor. The taking of any such tests by Owner in no way relieves Contractor from testing to assure itself of compliance with the Contract Documents.

C. Approved Structural Steel Fabricators:

1. Contractor shall pay for any required structural steel fabrication special inspections.

D. Cast-in-Place Concrete Strength Testing Requirements:

1. Concrete test cylinders will be made by Owner or Owner's Testing Laboratory. Contractor shall be responsible for proper care of cast cylinders while on the Project site (with respect to temperature, humidity and protection).
2. Contractor is also responsible for timely transportation to the laboratory in Spokane (or closer) on a schedule that will permit adequate laboratory curing before testing.
3. Contractor shall notify the Owner at least 48 hours before any concrete pour to allow time for observation.
4. Frequency and location of tests are to be determined. As a minimum, four test cylinders will be made for each day's pour or for every hundred cubic yards, whichever is greater.
5. The results of Owner's tests will be made available to Contractor.
6. The quality of all concrete is to be the sole responsibility of Contractor. If Contractor feels that additional testing is required to assure continued quality control, the frequency, testing, and payment therefore is Contractor's responsibility.

E. All Other Work Inspection and Testing Requirements:

1. Contractor shall, at no additional cost to Owner, provide all inspections and tests required to assure full compliance with the Contract Documents. Unless specifically required, Contractor is not required to submit copies of such test results to Owner. Contractor, however, shall maintain copies of all testing and inspection reports at the Project site for inspection and copying by Owner.
2. The performance of testing or inspection by Owner or Owner's Testing Laboratory does not relieve Contractor from responsibility for meeting all requirements of the Contract Documents.

END OF SECTION 01 45 00

PART 1 GENERAL

1.01 SUMMARY

A. General: Owner will select and employ an independent testing agency, engineering service, or a special inspector to conduct the tests and inspections to be provided by Owner. Inspections that are normally associated with obtaining State approval (e.g., electrical work as specified in Division 26, etc.) shall be provided and paid for by Contractor. Contractor shall comply with all applicable building codes and provide all testing services required by the Contract Documents unless specifically identified as Owner's responsibility.

B. Owner's testing agency shall prepare test reports, logs and certificates applicable to the Work for which Owner will provide testing and shall deliver the specified number of copies to the designated parties. If any inspection or testing reveals 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 Owner's services and expenses, shall be at Contractor's expense.

1.02 DESCRIPTION

A. Definition: For the purpose of this Section, all references made herein to testing laboratory, testing agency, or special inspector shall refer to as the tests or inspections conducted by a special inspector provided by Owner.

1.03 QUALITY ASSURANCE

A. Qualifications: Contractor's inspection personnel must be approved by Owner and possess certain qualifications as stated in this Section. The testing agency shall comply with all requirements of ASTM E329.

1. The inspector for waterproofing and roofing shall have specialized technical knowledge and experience specific to waterproofing and roofing.
2. The testing agency for concrete testing and inspection services should be an agency other than the agency employed by Contractor for the purpose of establishing concrete mix designs, etc.
3. Geotechnical inspection will be performed by a licensed geotechnical consulting firm.

1.04 DUTIES OF OWNER'S TESTING AGENCY

A. General: Testing agencies shall conduct testing and inspection services, interpret them, evaluate the results for compliance with the Contract Documents, and report the findings to the Owner, Contractor, and local building authority, as applicable. Testing and inspection services shall be performed in accordance with applicable ASTM standard methods or other specified procedures.

B. Testing: Materials to be tested are those so specified and others as Owner or authorities having jurisdiction over the Project may direct.

C. Inspection: Inspections, continuous and special, shall be performed by the inspectors as required by the Contract Documents and authorities having jurisdiction.

D. Rejected Work: Inspectors shall have the right to recommend rejection of materials and workmanship that is defective. Rejected workmanship shall be satisfactorily corrected and rejected materials shall be removed from the Project site without charge to Owner. If Contractor does not correct rejected work within a reasonable time, Owner may elect to correct the work and charge the expense to Contractor.

E. Inspectors are not authorized to do the following:

1. Release, revoke, waive, alter, or enlarge on requirements of the Contract Documents;
2. Approve or accept any portion of the Work, except as specified for soil conditions (i.e. bearing capacities, etc.);
3. Perform any duties of Contractor; or
4. Stop Work.

F. Should the Owner elect at any time before Final Acceptance to make an examination of Work already completed by removing or tearing out the same, Contractor shall on request promptly furnish all necessary facilities, labor, and material. If such Work is found to be defective in any respect, Contractor shall be responsible for the cost of such examinations and of satisfactory reconstruction. If such Work is found to meet the requirements of the Contract, however, Owner shall be responsible for the cost of such examinations and of satisfactory reconstruction.

1.05 PAYMENTS

A. Owner shall pay for the cost of initial testing and inspection, except as otherwise specified in the Contract Documents. Initial tests and inspections are defined as the first tests and inspections as hereinafter specified.

B. In the event any test or inspection reveals Work not in compliance with the Contract Documents, Contractor shall pay for or be backcharged for all costs of re-testing and/or re-inspection.

C. Additional tests and inspections not herein specified but requested by Owner shall be paid for by Owner, unless the results of such tests or inspections reveal Work not in compliance with the Contract Documents, in which case Contractor shall pay for or be backcharged for all costs of testing, re-testing, re-inspection, and any related Owner costs.

D. Costs for additional tests or inspections required because of any change in materials or change in the source of supply from that specified shall be paid by or backcharged to Contractor.

E. Contractor is responsible for all work required to correct any deficiencies.

F. Contractor is responsible for the cost of any testing required for the convenience of Contractor in the scheduling and performance of the Work.

G. Contractor is responsible for the cost to verify testing done without prior notice, with improper supervision, or contrary to construction practice, and for testing of materials for which mill reports are required but not furnished.

H. Contractor is responsible for the cost of any testing that is required to be performed by Contractor by the Contract Documents.

1.06 TESTS AND INSPECTION REPORTS

A. Copies of Test and Inspection Reports: Copies of test and inspection reports will be distributed at weekly intervals. Such reports shall include all tests performed, regardless of whether such tests indicate that material is satisfactory or unsatisfactory. Samples taken but not tested shall also be reported. Records of special sampling operations shall also be reported. Test and inspection reports shall be distributed electronically as requested by Owner.

B. Test and inspection reports shall be distributed as follows:

1. Architect/Engineer;
2. Owner; and
3. Contractor.

1.07 CONTRACTOR'S RESPONSIBILITIES

A. Coordination: Contractor shall initiate and coordinate all required tests and inspections, including conforming with requirements of applicable public agencies and authorities. Inspection of the Work does not relieve Contractor of any obligation under the Contract. The Owner's Designated Representative shall have authority to reject Work that is not in compliance with the Contract Documents.

B. Access: Inspectors shall at all times have free access to the Work, wherever the Work is in preparation. Contractor shall at all times provide and maintain proper facilities and safe access for such inspection. Contractor shall also cooperate with testing personnel and furnish access, tools, samples, certifications, test reports, design mixes, equipment, storage, and requested assistance.

C. Storage Facilities: Contractor shall furnish adequate storage facilities for the sole use of the testing laboratory for safe storage of specimens that must remain on the site.

D. Data: Furnish records, drawings, certificates and similar data, including Shop Drawings and Change Orders, as may be required by the testing and inspection personnel to confirm compliance with the Contract Documents.

E. Notice: Contractor shall furnish notice to Owner and inspector at least 48 hours in advance of all required tests and inspections, unless otherwise specified.

F. Defective Work: Contractor shall remove and replace any Work found defective by Owner or not complying with the Contract Documents at no additional cost or Contract Time. Where testing personnel take cores or cut-outs to verify compliance, repair prior to acceptance. Where defective Work requires redesign, any redesign costs shall be paid for by Contractor.

G. Cancellations: Contractor shall give sufficient advance notice to the inspector to allow in the event of any cancellation or rescheduling of a previously scheduled test or inspection. Any charges due to insufficient advance notice of cancellations or delay shall be paid by or back-charged to Contractor.

1.08 TEST FAILURES

A. Where a sample fails to pass a required test, Owner may permit re-testing of the sampled material. In such cases, two samples shall be tested and the material shall be rejected if either of the two subsequent samples fail.

1.09 REPORTING TEST FAILURES

A. Immediately upon inspector’s determination of a test failure, inspector shall notify Owner. On the same day, inspector shall send written test results to those named on the distribution list above.

1.10 REMOVAL OF MATERIALS

A. Unless otherwise directed, materials not conforming to the requirements of the Contract Documents shall be promptly removed from the Project site and properly disposed of without additional expense to Owner.

END OF SECTION 01 45 23

PART 1 GENERAL

1.01 SUMMARY

A. Contractor shall be evaluated on performance throughout the course of the contract to provide past performance documentation for future projects.

B. Section includes:

1. Program Objectives;
2. Performance Categories and Assessment;
3. Evaluation Reports;
4. Notice, Review and Appeal.

1.02 PROGRAM OBJECTIVES

A. The Contract Performance Evaluation Program is intended to improve contractor selection given the following primary objectives:

1. Assist the Owner in evaluating the contractor's qualifications and proven ability to successfully perform future contracts when past performance has been previously documented;
2. Provide the University objective data relating to Contractor responsibility;
3. Provide contractors with a means of enhancing their qualifications and reputation by receiving recognition for exceptional performance;
4. Encourage better working relationships between the University and the Contractor and to provide feedback to the contractor during and after the contract period;

1.03 PERFORMANCE CATEGORIES AND ASSESSMENT

A. Contractor shall be evaluated based upon the following categories:

1. Schedule and Time Management;
2. Quality Management;
3. Communication Effectiveness;
4. Management Approach;
5. Code and Compliance; and
6. Cost.

B. Each of the above categories will be assessed by multiple key project stakeholders and provided one of the following performance levels based upon objective and cumulative data:

1. Outstanding (5): Contractor has exceeded the majority of all of the

significant contract criteria and has met or exceeded the Schedule, Quality, Communications, Management, Code Compliance and Cost requirements of the contract. The contractor was extremely or completely knowledgeable of the contract requirements and applicable laws and regulations. A very consistent high level of cooperation, project management, and job site control appreciably contributed to an unusually good result.

2. Very Good (4): Contractor has exceeded many of the significant contract criteria and has met or exceeded some of the Schedule, Quality, Communications, Management, Code Compliance, and Cost requirements of the contract. The contractor was knowledgeable of the contract requirements and applicable laws and regulations. Was generally cooperative and performed their work with minimal prompting. Their performance results were very good.

3. Satisfactory (3): Contractor has satisfactorily met the overall contract criteria and has met the overall Schedule, Quality, Communications, Code Compliance and Cost requirement of the contract. The contractor occasionally had to be prompted or reminded of the contract requirements, but overall the project was acceptable, producing an acceptable result.

4. Marginal (2): Contractor may have met many, but not all, of the contract criteria and failed to meet one or more of the Schedule, Quality, Communications, Code Compliance or Cost performance requirements of the contract. Even though the project may have been accepted, the contractor's performance, as evaluated, was marginal overall. The contractor frequently had to be prompted or reminded of the contract requirements; overall the project was less than satisfactory.

5. Unsatisfactory (1): Contractor failed to meet many or most of the contract criteria and failed to meet the overall Schedule, Quality, Communications, Code Compliance and Cost performance requirements of the contract. While the project may have been accepted by the owner, the effort expended in prompting the contractor to perform was excessive. The contractor's poor or uncooperative performance created serious unnecessary and avoidable difficulties in achieving contract completion.

1.04 EVALUATION REPORTS

A. At the midpoint of project completion, Owner shall provide contractor with a draft Contract Evaluation Report based upon the current performance during the contract. This shall provide the Contractor an opportunity improve performance levels during the contract, and provide an opportunity for Contractor-Owner communication and working relationship.

B. A final Contract Performance Evaluation Report will be completed upon contract completion and shall become the official report of record.

1. A Summary Contract Performance Evaluation will be provided to the Contractor within 30 calendar days after Final Completion.

2. Final Contract Performance Evaluation Reports will remain on record for a minimum of 5 years from date issued.

C. Upon receipt of the Summary Contract Performance Evaluation, Contractor shall review the report and may request a debrief conference within 21 calendar days of receipt.

D. If after the debrief, Contractor would like to dispute the evaluation findings the Contractor shall submit in writing, the specific reasons for disagreement and include the basis for their appeal within 14 calendar days following the debrief.

1. Upon receipt of appeal, Owner shall convene a review with the Assistant Vice President, Facilities Services, Capital to consider the objectivity, accuracy, completeness and fairness of the Contract Performance Evaluation.

2. The Contractor shall be notified and issued a final determination within 30 calendar days of receipt of the appeal.

END OF SECTION 01 45 34

PART 1 GENERAL

1.01 TEMPORARY UTILITIES

A. Owner may furnish to Contractor temporary Owner-owned utilities when available and upon Owner written approval. Owner reserves the right to restrict the use of its utilities if, in its opinion, Contractor fails to adequately conserve utilities or to use utilities appropriately. When using Owner-owned utilities, Contractor is to make metered connections to the nearest available service and disconnect same when no longer needed.

B. If Owner-owned utilities are not available at the Project site, or if Owner restricts use of Owner-owned utilities, Contractor shall obtain required services from commercial sources or public utilities, and Contractor is responsible to pay for all utility costs.

C. Contractor shall field verify the availability of utility services provided by Owner and coordinate the Work accordingly.

D. In remodeling projects where portions of the building are to remain in service, Contractor shall be responsible for coordinating the Work to maintain utility services to the occupied portions of the building.

1.02 TEMPORARY ELECTRICAL SERVICE

A. Contractor shall provide all services required for construction operations and may connect to existing services when available upon Owner approval. .

B. Contractor shall provide lighting for construction operations.

C. Contractor may use existing lighting when available and adequate.

D. Contractor shall maintain site lighting throughout the duration of the Work.

1.03 HEAT AND VENTILATION

A. Contractor shall provide heat and ventilation as required to maintain specified conditions for construction operations and to protect materials and finishes from damage due to temperature or humidity.

B. After a building is substantially enclosed, the permanent heating system or a temporary hook-up of equipment from the permanent system may be used for temporary heat provided that the equipment is properly installed by the responsible electrical and mechanical Subcontractors and available for supplying temporary heat. Owner shall be the sole judge of the adequacy of the building enclosure for temporary heating or cooling purposes.

C. Contractor shall arrange with the electrical and mechanical Subcontractors installing said systems and equipment for the use, operation, and maintenance of the systems. Contractor shall pay for all connections and attendants for

temporary heating, including necessary accessories such as temporary (construction) air filters to protect the air distribution systems from contamination.

D. Contractor shall provide a dust free air distribution system and correct all damage to this system caused by the Work.

E. In existing facilities, Contractor shall coordinate use of the existing systems with Owner. Contractor shall extend and supplement with temporary units as required to maintain specified conditions for construction operations.

F. Use of electric resistance type heating systems for temporary heat is prohibited.

G. The warranty period for any permanent equipment used during construction will not commence until Contractor achieves Substantial Completion.

1.04 TEMPORARY WATER SERVICE

A. Unless available from an Owner-owned utility, Contractor shall provide service required for construction operations. At all times, Contractor shall utilize backflow/cross-connection devices, certified by Owner, to safeguard water supply.

B. For Work in existing facilities, Contractor shall connect to existing services when approved by Owner and extend branch piping with outlets so that water is available for use by all persons associated with the Work.

C. Provide drinking water from a safe source for all those associated with the Work.

1.05 SANITARY FACILITIES

A. Use of permanent and/or existing Owner’s facilities will be allowed as long as proper cleanliness is maintained. If, in the opinion of the Owner, restrooms are not being properly maintained, Contractor will be required to provide its own sanitary facilities at its own expense.

B. Owner will designate any restrooms that can be used by Contractor personnel.

1.06 BARRIERS

A. Contractor shall provide barriers as required to prevent public entry to construction areas and to protect existing facilities and adjacent properties from damage from construction operations.

B. When temporary fencing is indicated by the Drawings, or if fencing is provided at Contractor's option, enclosures shall be constructed of 6 feet high commercial grade chain link with vehicular and personnel gates, as required.

1.07 ENCLOSURES

A. Contractor shall provide temporary weather-tight closures of openings to provide

acceptable working conditions, protect materials, facilitate temporary heating, and prevent entry of unauthorized persons. Provide doors with self-closing hardware and locks.

B. Contractor shall provide temporary roofing when so indicated by the Drawings or when made necessary by the Project requirements.

C. Contractor shall provide temporary dust-proof partitions when required to confine dust and moisture to the immediate Work area.

D. Contractor shall provide temporary noise-proof partitions when required to confine noise to the immediate Work area.

1.08 PROTECTION OF EXISTING FACILITIES

A. Utility Tunnel Protection: Contractor shall provide adequate planking across any tunnels to distribute loads and prevent damage. If necessary, Contractor shall provide temporary shoring inside tunnel areas.

B. Low Overhead Clearance: Contractor shall be fully responsible for addressing all vehicular limitations caused by low overhead restrictions throughout campus. Route all traffic to avoid damage to overhead structures. Review proposed routing with Owner prior to commencement of construction.

C. Tree and Plant Protection: Contractor shall protect trees and other plants not scheduled for removal; maintain protection until Project completion.

1. In the event that a tree or plant is damaged as a result of the Work that, in the opinion of Owner, requires replacement, Contractor shall be responsible for such replacement.

2. If at any time Contractor judges that the protection of plant materials designated to be saved is incompatible with Work required, or if operations necessarily threaten the health of any plant material, Contractor shall immediately notify Owner and cease Work affecting the area until a written agreement is reached concerning acceptable procedure.

1.09 SECURITY

A. Contractor shall provide security to protect the Work, existing facilities, and Owner's operations from unauthorized entry, vandalism, and theft. Coordinate with Owner's security program.

B. During construction, all openings to Owner's utility tunnel system must be protected against unauthorized entry. Contractor shall provide closures, approved by Owner, including locked doors or hatches at any openings created by the Work.

1.10 PROTECTION OF INSTALLED WORK

A. Contractor shall provide temporary protection for installed products. Control traffic in immediate area to minimize damage.

B. Contractor shall provide protective coverings for walls, projections elevator cabs, jambs, sills, and soffits of openings. Protect finished floors and stairs from traffic, movement of heavy objects, and storage.

C. Contractor shall prohibit traffic and storage on waterproofed and roofed surfaces and on lawns and landscaped areas.

1.11 CLEANING DURING CONSTRUCTION

A. Contractor shall clean the site each day during construction and shall prevent the accumulation of waste materials and rubbish.

B. Contractor shall clean interior areas prior to the start of finish Work and maintain areas free of dust and other contaminants during finishing operations.

1.12 OFF-SITE CLEAN UP

A. Contractor shall continuously keep sidewalks, lawns, parking areas, and streets clear of construction materials, debris, gravel, rock, and dirt related to the Project.

1.13 LIFTING DEVICES AND HOISTING FACILITIES

A. Contractor shall provide cranes, hoists, towers, and other lifting devices necessary for the proper and efficient movement of materials.

1.14 MECHANICAL AND ELECTRICAL SYSTEM SHUT-DOWNS

A. Any shut-down of mechanical or electrical systems affecting Owner's operations shall be scheduled by Contractor during off-hours. Contractor shall submit a written shut-down request providing at least 14 Days advance notice. Any shut-down must be coordinated with and approved by Owner.

1.15 CONSTRUCTION PARKING

A. Contractor's employees may park only in accordance with campus traffic and parking regulations and pay all required fees.

B. When working in Pullman's central campus, Contractor’s vehicular use will be limited to the following:

1. Delivery of materials to and from Project site;
2. Single vehicle for use by Project supervisor of each major Contractor (four total vehicles maximum); and
3. Workers' vehicles shall not be allowed to park in the central mall.

1.16 NOISE CONTROL

A. Any construction related noise that interferes or is likely to interfere with normal use of adjacent space(s) shall be scheduled and approved by Owner.

B. Contractor shall restrict any construction related noise to the hours approved by Owner and in accordance with the state and local noise ordinance.

C. Owner may approve Contractor working extended hours. Request any extended hours of operation with Owner.

1.17 TRAFFIC OBSTRUCTIONS

A. Contractor shall submit a written traffic control plan for all traffic obstructions, either pedestrian or vehicular, for approval by Owner, per the Pre-Construction Submittal Requirements of Section 01 33 00.

B. In some cases, it may be necessary to develop special routes for large or unwieldy deliveries that could interfere with pedestrian movement, especially at peak times.

C. Contractor shall avoid deliveries or equipment operations that block street traffic during peak times.

D. Pedestrian Obstructions: Any equipment on sidewalks or other pedestrian ways shall be barricaded. Barricades shall include a horizontal member at a maximum of two feet above the walking surface.

1.18 REMOVAL OF TEMPORARY FACILITIES

A. Contractor shall remove temporary materials, equipment, services, and construction facilities prior to Substantial Completion inspection.

B. Contractor shall clean and repair damage caused by installation or use of temporary facilities.

C. Contractor shall restore existing facilities used during construction to specified or original condition.

END OF SECTION 01 50 00

PART 1 GENERAL

1.01 PRODUCTS

A. Products include material, equipment, and systems.

B. Comply with Specifications and referenced standards as minimum requirements.

C. Components required to be supplied in quantity within a specification section shall be the same, and shall be interchangeable.

D. All materials shall be new unless specifically noted otherwise.

1.02 TRANSPORTATION AND HANDLING

A. Transport products by methods to avoid product damage; deliver in undamaged condition in manufacturer's unopened containers or packaging, dry.

B. Provide equipment and personnel to handle products by methods to prevent soiling or damage.

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

1.03 STORAGE AND PROTECTION

A. Store products in accordance with manufacturer's instructions, with seals and labels intact and legible. Store sensitive products in weather-tight enclosures; maintain within temperature and humidity ranges required by manufacturer's instructions.

B. For exterior storage of fabricated products, place on sloped supports above ground. Cover products subject to deterioration with impervious sheet covering; provide ventilation to avoid condensation.

C. Store loose granular materials on solid surfaces in a well-drained area; prevent mixing with foreign matter.

D. Arrange storage to provide access for inspection. Periodically inspect to assure products are undamaged, and are maintained under required conditions.

1.04 VARIATION FROM SPECIFIED PRODUCTS

A. Subsequent to Bid Opening/Proposal - Approved Equivalents:

1. Requests for approved equivalents will only be considered when approved equivalent statements, used in reference to product

specifications, are specifically provided for within individual Specification sections.

2. The terms "or an approved equivalent", "approved equivalent", or similar statements, when used herein in connection with manufacturers' products, shall be understood to mean products that are equally effective and suitable for their intended use; based on the judgment of the Owner, whose decision shall be final.

3. Written requests for consideration by the Owner of approved equivalents may be submitted throughout the Project.

4. Time extensions and additional costs resulting from use of approved equivalent products will not be considered.

B. No Substitutions:

1. The terms "No Substitutions", "Alternative Products not Acceptable", or similar statements used in reference to product specifications, shall mean that only the specified product will meet the needs of the University and that no other products will be considered at any time before or during the Project.

C. Requirements and Procedures for Product Variations:

1. The Contract is based on the standards of quality established in the Contract Documents.

2. Substitution or approved equivalent revisions shall be made only with the prior written acceptance of the Owner.

3. All requests for substitutions or approved equivalents must be on the proposer's letterhead and shall be accompanied by complete specifications, samples, records of performance, certified copies of tests by impartial and recognized laboratories, and such other information as the Owner may request to prove the merit of the proposed revisions.

4. The Contractor assumes the responsibility for capacity, dimensions, clearance, etc., of the named manufacturer's particular item to assure that the revision meets the requirements.

5. The Contractor shall assume the cost of any redesign, in the form of changes to the Drawings, or for the Work of any other trades, or any other costs required to properly incorporate any revision associated with substitutions or use of approved equivalent products.

6. Final decisions as to the quality and suitability of proposed revisions will rest solely with the Owner and will be based on proof submitted.

7. When the Owner approves a substitution or approved equivalent proposed by the Contractor, it is with the understanding that the Contractor certifies that the article or material is equivalent to or better than that specified.

END OF SECTION 01 60 00

PART 1 GENERAL

1.01 PURPOSE

A. Provide for an orderly, timely, and efficient completion of the Work for Owner.

1.02 SUBSTANTIAL COMPLETION

A. Requirements for Substantial Completion: Contractor shall comply with all requirements for Substantial Completion identified in the General Conditions and other Contract Documents. Prior to Substantial Completion, Contractor must have constructed the Work in substantial accordance with the Contract Documents, and:

1. Certificate of Occupancy received from the AHJ.
2. All elements of the Work must be operational and in good working order and condition, except for incidental punchlist Work;
3. The fire and life safety systems, if any, must be tested and accepted;
4. Any elevators must be operational, functioning, and in good working order and condition, and be fully approved for use;
5. All mechanical, electrical, plumbing, telecommunications, security, and access control systems must operate and function in good working order and condition, including commissioning;
6. The finish portion of the Work must be complete including but not limited to paint, trim, doors, partitions, cabinetry, floor coverings, ceilings, wall finish, and other finish surfaces, except for incidental punchlist Work;
7. All roadway improvements, paving, sidewalks, parking areas, other street improvements, lighting, landscaping and irrigation must be complete;
8. Utilities must be complete, connected, and operating normally;
9. Contractor must have removed all construction facilities, temporary controls, and construction debris;
10. Contractor must have completed training Owner’s personnel on all operating instructions and submitted training DVDs; and
11. Final cleaning.

B. Prior to Substantial Completion Contractor shall request in writing that Owner grant Substantial Completion. Accompanying the request Contractor submit the following:

1. A list of all items remaining to be completed or corrected;
2. Signed originals from authorities having jurisdiction of all certificates of compliance and final approval, as applicable;
3. All system software files required by the Contract Documents, including but not limited to lighting and environmental controls;

4. Revised Draft Operation & Maintenance manuals; and
5. Draft Project Record.

C. Upon satisfactory completion of the requirements for Substantial Completion, Owner shall prepare and forward to Contractor a letter of Substantial Completion. The letter will identify the date of Substantial Completion and include a punch list identifying all remaining incomplete Work. Contract warranties shall begin as of the date of Substantial Completion.

1.03 FINAL COMPLETION

A. Requirements for Final Completion: Upon receipt of Contractor's written Notice that Contractor has inspected and completed punch list items and that the Work is ready for final inspection and acceptance, Owner will promptly make such inspection accompanied by Contractor. If Owner determines that some or all of the punch list items are not complete, Contractor shall be responsible to Owner for all costs, including re-inspection fees, for any subsequent inspection to determine completion of the punch list. When Owner finds all punch list items complete and the Work and Contract fully performed, Owner shall establish the date of Final Completion. Owner is not required to establish Final Completion until the following are complete:

1. Complete all requirements listed in the Contract Documents for Substantial Completion of the Work;
2. Complete all remaining punch list items and remaining Work, and obtain approval by Owner that all Work is complete;
3. Obtain permanent occupancy permits (if only a temporary occupancy permit was issued at Substantial Completion);
4. Submit Project Record, any final property survey, and final Operation and Maintenance manuals (if not previously submitted) required by the Contract Documents;
5. Deliver any required tools, spare parts, extra stock of material and similar physical items to Owner as required by the Contract Documents;
6. Complete cleaning after completion of punch list;
7. Submit executed warranties;
8. Complete any required sustainability documentation for which Contractor is responsible;
9. Submit a final comprehensive list of all Subcontractors of all tiers and suppliers for the Project; and
10. Submit certification that materials used in the Work are "asbestos-free" and that all requirements of governing jurisdictions related to the Project have been addressed.
11. Final Project Record.

B. Upon satisfactory completion of the requirements for Final Completion, Contractor shall submit a final Application for Payment.

1.04 FINAL ACCEPTANCE

A. Requirements for Final Acceptance: Final Acceptance shall be established by Owner in writing. Owner shall not be obligated to accept the Project as complete before Final Completion has occurred and Contractor has submitted the following:

1. An affidavit that all payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which Owner or Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, except for any claims that are specifically identified on the affidavit (Affidavit of Payment of Debts and Claims, AIA form G706 or equivalent).
2. A certificate or written statement evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect and will not be canceled or allowed to expire until at least 30 Days' prior written Notice has been given to Owner.
3. Receipt of consent of surety, if any, to final payment (AIA form G707 or equivalent).
4. If required by Owner, other data establishing payment or satisfaction of obligations, such as receipts, 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. If a Subcontractor refuses to furnish a release or waiver required by Owner, Contractor may furnish a bond satisfactory to Owner to indemnify Owner against such lien. If such lien remains unsatisfied after payments are made, Contractor shall refund to Owner all money that Owner may be compelled to pay in discharging such lien, including all costs and reasonable attorneys' fees.
5. Provide copy to Owner of all "Affidavits of Wages Paid". Pursuant to RCW 39.12.040, an "Affidavit of Wages Paid" from Contractor and from each Subcontractor certified by the Industrial Statistician of the Washington State Department of Labor and Industries, with the fees paid by Contractor or Subcontractor.

B. Contingent upon completion of all Affidavits of Wages Paid, the "Notice of Completion of Public Works Contract" form may be completed by Owner.

1.05 RETAINAGE

A. Retainage must be held at least 45 Days following Final Acceptance. If there are either unpaid taxes or fees, or unsatisfied claims of lien against the retained percentage, disbursement of retainage funds will be made in accordance with Washington law.

B. The retainage will be held and applied by Owner as a trust fund in the manner

required by RCW 60.28. Release of the retainage will be processed in the ordinary course of business following Final Acceptance of the Work by Owner, provided no notice of lien has been given as provided in RCW 60.28, no claims have been brought to the attention of Owner, Owner has no claims under the Contract, and the requirements below have been met.

C. Owner shall not release retainage until the following requirements have been satisfied.

1. "Certificate of Payment of State Excise Taxes by Public Works Contractor": Following receipt of Owner's notice of completion and after determining that all taxes, increase and penalties due from Contractor have been paid, the Department of Revenue will issue this certificate to Owner.

2. "Certificate of Payment of Contributions, Penalties and Interest on Public work Contract": Upon receiving a copy of Owner's notice of completion and after determining that Contractor is in compliance with the provisions of the Employment Security Act, the Employment Security Department will issue this certificate to Owner.

3. "Certificate of Release": Upon receipt of Contractor's request for release and verification from its records that required premiums have been paid by Contractor and each Subcontractor, the Department of Labor and Industries will issue a statement to that effect.

END OF SECTION 01 70 00

PART 1 GENERAL

1.01 SUMMARY

A. This Section specifies administrative and procedural requirements for field engineering services, including but not limited to the following:

1. Land survey Work; and
2. Establishment of coordinated reference points for general building layout and location.

1.02 SUBMITTALS

A. Project Record: Contractor shall submit a record of Work performed and record survey data as required by the Contract Documents.

1.03 QUALITY ASSURANCE

A. Surveyor: Contractor shall engage a registered Professional Land Surveyor registered in the State of Washington to perform the required land-surveying services.

B. Owner may furnish surveys describing physical characteristics, legal limitations, utility locations, and a legal description for the Project site. Contractor may rely on the information furnished by Owner but must exercise proper precautions to ensure the safe performance of the Work. Contractor shall assume that the locations of any underground or hidden utilities, underground tanks, plumbing, or electrical runs indicated in the surveys or Contract Documents are shown in approximate locations, but Contractor is responsible for verifying the location of all utilities impacted by the Work. Additionally, Owner may make available to Contractor the results of investigations of hidden or subsurface conditions for the convenience of Contractor. While Contractor may rely upon such investigation results, there is no guarantee, express or implied, that the conditions indicated are representative of those existing throughout the Project site, or that unforeseen developments may not occur. Contractor is solely responsible for interpreting the information and extrapolating beyond the location, including each individual boring, test pit, or other locations.

1.04 EXAMINATION

A. Identification: Contractor shall verify the location of benchmarks and control points provided by Owner.

B. Contractor shall verify layout information on Drawings in relation to the property survey and existing benchmarks before proceeding to layout the Work. Contractor shall also locate and protect existing benchmarks and control points and preserve permanent reference points during construction.

1. Do not change or relocate benchmarks or control points without prior written approval of Owner. Promptly report lost or destroyed reference points and requests to relocate reference points because of changes in grades or locations.

2. Promptly replace lost or destroyed Project control points. Base replacements on the original survey control points.

C. Contractor shall establish and maintain a minimum of two permanent benchmarks at the Project site.

1. Record benchmark locations, with horizontal and vertical data, on Project Record.

D. Existing utilities and equipment: The existence and location of underground and other utilities are not guaranteed. Before beginning the Work, Contractor shall investigate and verify the existence and location of underground and other utilities (including irrigation and snow melt systems).

1. Prior to construction, verify the locations and invert elevation at points of connection sanitary sewer, storm sewer, and water service piping.

1.05 PERFORMANCE

A. Contractor shall work from lines and levels established by the property survey; establish benchmarks and markers to set lines and levels at each story of construction and elsewhere as needed to locate each element of the Project; and calculate and measure required dimensions within indicated or recognized tolerances. Do not scale Drawings to determine dimensions.

1. Advise entities engaged in Work activities of marked lines and levels provided for their use.

2. As construction proceeds, check every major element for line, level, and plumb.

B. Surveyor's Log: Contractor shall maintain a surveyor's log of control points and other survey Work. Make this log available to Owner for reference.

1. Record deviations from required lines and levels and advise Owner when deviations that exceed indicated or recognized tolerances are detected. On Project Record, record deviations that are accepted and not corrected.

2. Following completion of foundation walls, major site improvements, and other Work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and site Work.

C. Site Improvements: Contractor shall locate and lay out site improvements, including pavement, stakes for grading, fill and topsoil placement, utility slopes, and invert elevations.

D. Existing Utilities: Contractor shall furnish information necessary to adjust, move, or relocate existing structures, utility poles, lines, services, or other appurtenances affected by construction. Contractor shall coordinate with local authorities having jurisdiction.

E. Contractor shall record accurately on the Project Record the principal metes, bounds, lines, and levels of the Project.

END OF SECTION 01 71 23

PART 1 GENERAL

1.01 SUMMARY

A. This Section describes the waste management and recycle management criteria for debris and solid waste generated as part of the Work.

B. Contractor shall be responsible for sorting, segregating, and placing designated waste materials into containers provided by Owner. Contractor shall be responsible for segregating and disposing all unacceptable and dangerous wastes as defined below.

C. Owner shall be responsible for furnishing waste collection containers, servicing those containers, and disposing solid waste from the Project, with the exception of unacceptable and dangerous waste.

D. Waste that is disposed of by 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.

1.02 DEFINITIONS

A. Construction Waste: Waste resulting from the Work.

B. Dangerous Waste: Solid waste designated in WAC 173-303 and/or 40 CFR. As used in this Section, the words “dangerous waste” will refer to the full universe of wastes regulated by WAC 173-303 and 40 CFR.

C. Demolition Waste: Largely inert waste, resulting from the selective demolition of buildings, roads and other man-made structures such as cured concrete, asphaltic compounds, brick and masonry, ceramic, glass, steel, and aluminum, and non-inert materials such as clean wood, composition roofing and roofing paper, and minor amounts of metal. Plaster (i.e., sheetrock or plaster board) or any other material, other than clean wood, that is likely to produce gases or leachate during its decomposition process and asbestos waste are not considered to be demolition waste.

D. Land Clearing Waste: Natural vegetation and clean soils from clearing and grubbing land for development such as stumps, brush, weeds, tree branches, tree bark, mud, dirt, sod and rocks.

E. Recycle/Recycling: The process of separating waste materials for remanufacturing or reprocessing into usable or marketable materials. Examples of recycling include separating wood off-cuts for recycling by a wood processor into paper pulp, or separating cardboard, plastic, beverage containers, or miscellaneous metals for recycling.

F. Reuse: To use a construction waste material again in roughly its same form. Materials can be reused on-site or on other projects off-site. Examples of reuse

include removing a hardwood floor and reinstalling it in a new project, or using soil from one site as fill on another site.

G. Salvage: To remove a construction waste material or equipment from an existing building for reuse on-site or reuse on other projects off-site. Items to be salvaged shall be designated by Owner for removal and delivery to Owner.

H. Unacceptable Waste: All waste not authorized for disposal by Owner. This includes any waste that is now or hereafter defined by federal law or by the governing jurisdiction as radioactive, dangerous, hazardous or extremely hazardous waste, unsanitary waste, and vehicle tires in excess or those permitted to be disposed of by the laws of the governing jurisdiction. It does not include any waste destined for salvage, recycling, or general demolition.

I. Waste: All solid waste generated within the limits of the Project, or extra material or material that has reached the end of its useful life in its intended use. Waste includes salvageable and recyclable materials, masonry, and concrete.

J. Waste Management Plan: A Project-specific plan for the salvage, collection, transportation, recycling, and disposal of the waste generated at the Project site. A waste management plan includes procedures for separating, storing, and transporting waste and includes methods to assure proper implementation of the plan.

1.03 WASTE MANAGEMENT PLAN

A. Draft Waste Management Plan: Per the Pre-Construction Submittal Requirements of Section 01 33 00, Contractor shall submit to Owner a Draft Waste Management Plan. The Draft Plan shall contain the following:

1. List of materials to be salvaged, materials to be recycled, and materials to be disposed of as solid waste, and dangerous waste.
2. General material handling methods, including segregation and sorting, and placing solid waste into designated containers, on-site storage, and any special procedures for removing and protecting materials.
3. Plan for communicating salvage and recycling requirements on the Project.
4. Dangerous waste identification, accumulation, and disposal management procedures.
5. Materials to be sorted, salvaged, and recycled:

At a minimum, the following types of materials in reusable condition shall be salvaged and sorted. Contractor shall remove and deliver to the Owner at designated location.

1) Pumps and valves.

b. At a minimum, the following types of materials shall be sorted and included for recycling:

1) All metals (from banding, stud trim, ductwork, piping, rebar,

roofing, other trim, steel, iron, galvanized sheet steel, stainless steel, aluminum, copper, zinc, lead, brass, and bronze);

2) Beverage containers;

3) Cardboard (from supplies and packaging);

4) Clean wood (all unpainted, untreated wood scrap including pallets and engineered wood);

5) Mixed office paper (including blue prints);

6) Film plastic (from shrink wrap and other packaging, and sheeting used as protection or erosion control); and

7) Plate glass.

c. With the exception of unacceptable waste, all materials not designated for salvage or recycle per Paragraph 1.03(A)(5) above, may be co-mingled and disposed of as waste.

B. Dangerous Waste Management:

1. Contractor is responsible for all dangerous waste generated during the Project shall be identified, accumulated and disposed in accordance with WAC 173-303. Contractor generated dangerous waste must be shipped for disposal within 90 Days of generation.

2. Contractor may accumulate dangerous waste in accordance with WAC 173-303 and Washington Department of Ecology Technical Information Memorandum 94-120, Satellite Accumulation. If Contractor accumulates dangerous waste in volume greater than 55 gallons or acutely hazardous waste in a volume greater than one quart, Contractor shall establish and operate a “90-Day” accumulation area in accordance with WAC 173-303.

3. Contractor shall dispose dangerous waste only through vendor(s) approved by Owner. 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. Contractor shall pay for said audits. Contractor shall coordinate with Owner’s Environmental Health & Safety (EH&S) Department for transportation and disposal of all Project generated dangerous waste. EH&S will sign all Uniform Hazardous Waste Manifests.

C. Final Waste Management Plan: Once Owner has reviewed the draft Waste Management Plan and responded with comments or corrections, Contractor shall submit a final plan within 14 Days.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.01 WASTE CONTAINMENT

A. Contractor will provide and service containers for all wastes.

B. Contractor shall provide separate waste containers for and properly dispose of all unacceptable waste, including dangerous waste, in accordance with applicable law.

3.02 CONTAMINATION OF WASTE

A. Contractor shall take extraordinary care to ensure construction wastes are properly sorted, segregated, and placed within the correct containers.

B. Should any waste containers designated for salvage, recycle, or general disposal be cross-contaminated with dangerous or unacceptable waste, Contractor shall pay all costs of legally disposing the contaminated waste.

C. Project progress meetings shall include review of construction waste management as an agenda item.

END OF SECTION 01 74 19

PART 1 GENERAL

1.01 PURPOSE

A. Contractor shall submit advance/draft electronic of Operation & Maintenance manuals (O&Ms) at or immediately following the 80% Application for Payment. Subsequent Applications for Payment will not be processed until an advance/draft copy of the O&Ms has been submitted for review.

B. Contractor shall submit a final draft of O&Ms on or before Substantial Completion and provide training of Owner's staff in the operation and maintenance of the facility.

1.02 PROCEDURES

A. Together with a request for Substantial Completion, Contractor shall provide one revised draft electronic version of O&Ms,

B. To achieve Final Completion, Contractor shall submit :
1. Two final copies of O&Ms;
2. A text-searchable PDF electronic file of the O&Ms;
3. Separate Test & Balance Reports and Telecommunications Test Reports in an independent three ring binder;
4. A text-searchable PDF electronic file of the Test & Balance Reports and Telecommunications Test Reports.

PART 2 PRODUCTS

2.01 O&M MANUAL MATERIALS

A. O&M Manuals shall be bound into 3-ring binders (three sets) with the cover and spine to be composed and laid out per the cover page template on the last page of this Section.

B. The maximum thickness for each manual shall be 3". Multiple manual sets shall be organized by:

1. General,
2. Vertical Transportation,
3. Mechanical,
4. Electrical, and
5. Other (Laboratory Equipment, Special Equipment, etc.).

C. Paper shall be 8 1/2" x 11", 20 lb. white paper. Divisions within volumes are to be accomplished and annotated with permanently imprinted tabs (insertable indexes are not permitted) which indicate Specification Section numbers only.

D. Copies must be legible. Facsimile transmission copies are not acceptable. Original equipment manufacturer (OEM) printed material is preferred.

PART 3 EXECUTION

3.01 PRODUCTION

A. O&Ms are to be as follows:

1. Table of Contents – a listing of the contents of all volumes. This table of contents shall be inserted at the beginning of each volume in the set.

    a. Identify Contractor, include name, address, phone and fax number, and provide a contact name.

2. Subcontractor List – a list or spreadsheet, organized by Specification Section, of all suppliers and Subcontractors of all tiers who performed Work on the Project. Include the name, address, phone and fax number of Subcontractor or supplier, the Specification Section, and the description of the Work. When Subcontractors perform Work of more than one Specification Section, provide a separate listing of each Specification Section. This listing shall be at the beginning of volume #1 only.

    a. Written certification from Contractor attesting that no asbestos containing products have been incorporated into the Work.

3. Warranty List – a list or spreadsheet containing Contractor's one-year correction period obligation and all extended (greater than one-year) warranties, organized by Specification Section that indicates:

    a. Item Description (include here special warranty numbers or codes),

    b. Length of warranty,

    c. Specification Section, and

    d. Contractor's contact information, followed by physical copies of the Contractor's one-year correction period obligation and all extended warranties. Note that 1-year warranties from Subcontractors are not to be bound into each volume of the O&Ms. This warranty list and attendant warranties shall be at the beginning of volume #1 only, immediately following the asbestos certification.

4. Provide data as outlined in each specification section.

B. Original equipment manufacturer (OEM) information is required to be a part of all equipment information within the O&Ms.

C. Shop Drawings and product data initially submitted for acceptance are generally not acceptable for O&M use (one notable exception is snow melting cable layout drawing – a manufacturer detailed item). Routine Project components such as asphalt, concrete, pipe, fittings, conduit, etc., are not to be included in O&Ms.

END OF SECTION 01 78 23
(O&M cover and spine data on next page)

Facility #9512; Consolidated Information Center (CIC)

Tri-Cities CIC: Chiller Replacement

2022

General
O&M Manual

Vol. X of Y

(Spine and Cover)

PART 1 GENERAL

1.01 PURPOSE AND PROCEDURE

A. Contractor shall submit draft Project Record drawings on or before Substantial Completion. Requests for Substantial Completion will not be considered if submission of Project Record drawings has not occurred.

B. Contractor shall submit final Project Record drawings before Final Completion may be achieved.

PART 2 PRODUCTS

2.01 MATERIALS

A. Project Record drawings are to be red-line markings on original Drawings which clearly indicate the as-built dimensions (both horizontally and vertically) for all installed Work.

B. Identify on Project Record drawings all underground utilities encountered during the Work. Locate these utilities both horizontally and vertically and tie the dimension string(s) back to permanent and visible structures.

C. Clearly label each sheet with the words “PROJECT RECORD DRAWINGS.”

D. Do not affix requests for information (RFIs), change proposals (CCPs) or architectural supplemental instructions (ASIs) to the Project Record drawings. If all or part of a Drawing has been modified, it is acceptable to affix the revised layout over top of the original. However, all dimensions that have been modified are to be red-lined or yellow highlighted.

E. Copies must be legible.

PART 3 EXECUTION

3.01 PRODUCTION

A. During construction, Project Record information will be reviewed not less than monthly concurrent with the monthly review of the draft Application for Payment.

END OF SECTION 01 78 39

PART 1 GENERAL

1.01 DESCRIPTION

A. Owner has set the following indoor air quality requirements for site operations on the Project, within the limits of the Progress Schedule, Contract Sum, and available materials, equipment, products, and services. These include:

1. Protect workers on the site from air quality problems during construction.
2. Prevent indoor air quality problems in the completed facility.
3. Prevent indoor air quality problems in adjacent facilities.

B. To achieve these requirements, Contractor shall develop an “Indoor Air Quality (IAQ) Management Plan” for this Project.

C. Comply with current LEED Reference Guide.

1.02 IAQ MANAGEMENT PLAN MANAGER

A. Contractor shall identify an IAQ Management Plan Manager who will be responsible to monitor construction activities to ensure that the requirements of the IAQ Management Plan are met. The IAQ Manager may also be the Contractor’s Quality Control Manager. The IAQ Manager will be responsible for the following:

1. Draft and submit the IAQ Management Plan to Owner for acceptance.
2. Document IAQ Management Plan progress on a weekly basis.
3. Conduct meetings as required with all participants in the construction process to communicate the IAQ procedures and understand the importance of the requirements of the IAQ Management Plan. If necessary, post signs to ensure workers' safety.
4. Identify IAQ problems and institute remedial action as necessary.
5. Be present at regular Progress Meetings, as appropriate, and be responsible for providing a monthly written status report as it relates to IAQ for the Project and be prepared to discuss construction related IAQ procedures currently in effect.
6. At time of building flush-out, IAQ Manager shall be the contact person and shall be responsible for overseeing the entire flush-out process.

1.03 IAQ MANAGEMENT PLAN

A. Draft IAQ Management Plan: Submit a Draft IAQ Management Plan within 14 Days after Notice to Proceed, which contains preliminary descriptions of the following procedures for which Contractor is responsible (initial installation, verification that element(s) are in place, daily inspection and upkeep, and

removal):

1. List of indoor air quality protective measures to be instituted at Project site, including HVAC system protection during construction and any other control measure applicable to the Project;
2. A plan and schedule for inspection and maintenance of indoor air quality measures;
3. Installation sequencing for porous materials, including paint;
4. Measures to be employed to protect ducts and stored on-site or installed absorptive materials from moisture damage;
5. Type of filtration media used during construction;
6. Cleanup of contaminated components after construction.

B. The Draft IAQ Management Plan shall meet or exceed the minimum requirements of the current Sheet Metal and Air Conditioning National Contractors Association (SMACNA) IAQ Guidelines.

C. Final IAQ Management Plan: After review and comment on the "Draft IAQ Management Plan," Contractor shall submit a "Final IAQ Management Plan" that includes the finalized written procedures for above noted elements. This final plan shall address all review comments noted on the draft submittal and be submitted prior to the commencement of construction.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.01 IAQ MANAGEMENT PLAN IMPLEMENTATION

A. Contractor shall implement and maintain the approved IAQ Management Plan for the duration of the Project and update procedures at any time due to unanticipated building conditions. Contractor shall:

1. Use temporary filtration media during construction to protect HVAC at each return air grille; filtration media shall have a Minimum Efficiency Reporting Value (MERV) of 8 as determined by ASHRAE 52.2 - 1999. Isolate the return side of the HVAC system from the surrounding environment as much as possible. Return side shall have the heaviest Work areas dampered off and all return system openings sealed with plastic. Return side shall be shut down and sealed whenever possible.
2. Avoid the use of products, materials and operations that would cause IAQ problems or concerns.
3. Protect the ventilation system components (equipment and ductwork) from contamination, and provide cleaning of the ventilation components, including ductwork exposed to contamination during construction. Protect during transit and installation.

4. Provide ventilation as may be necessary to protect workers' health and avoid the accumulation of volatile compounds, dust and other harmful airborne contamination.

5. Provide weekly reports and photographs of construction IAQ management measures such as protection of ducts and 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.

6. Provide data sheets of filtration media used during construction and installed prior to building occupancy.

7. During installation of carpet, resilient flooring, paints, furnishings, and other VOC emitting products, provide supplemental (spot) ventilation for at least 72 hours after Work is completed and describe these activities in the weekly reports.

B. Contractor shall conduct regular inspection and maintenance of indoor air quality measures, including ventilation system protection and ventilation rate.

C. Contractor shall use low-toxic cleaning supplies for surfaces and equipment.

D. When dry sanding for gypsum board assemblies, Contractor shall 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; and

4. Sequence the Work to avoid contamination of other spaces with gypsum dust.

3.02 VENTILATION OF CONSTRUCTION FUMES

A. 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 in a manner approved by Owner. Contractor's method of exhaust shall ensure the safety of building occupants and pedestrians in and around the Project site. All supply and return air ductwork within the construction area shall be capped air-tight to prevent distribution of fumes.

3.03 COMPLETION PROCEDURES

A. Remove all IAQ measures as well as signs, framing, and supports at completion of Project.

END OF SECTION 01 81 19

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

A. Commissioning is a systematic process of ensuring that all building systems perform interactively according to the design intent and Owner's operational needs. This begins in the design phase and continues through construction. The commissioning process incorporates the traditionally separate functions of system documentation, equipment startup, control system calibrations, testing and balancing, performance testing, and training. Commissioning during the construction phase is intended to achieve the following specific objectives:

1. Verify that applicable equipment and systems are installed according to the Contract, manufacturer's recommendations, and industry accepted standards and that they receive adequate operational checkout by installing contractors.
2. Verify and document proper functional performance of equipment and systems.
3. Document all non-performing equipment and systems and track corrective actions through to final resolution.
4. Ensure compliance with State Energy Code Requirements (WA NREC Latest Revision).

B. Work includes the completion of formal commissioning procedures on selected equipment and systems. Commissioning procedures will be designed and coordinated under the direction of a Commissioning Agent (CA). Contractor is not responsible for hiring the CA. The CA will work directly for Owner. Contractor is responsible for coordinating and cooperating with the CA as necessary to complete the training and commissioning processes.

1.02 DEFINITION OF TERMS

A. Commissioning Agent (CA): Is an independent third-party consultant under contract with Owner. CA responsibilities are listed in Subsection 1.03 for information, reference, and clarification.

B. Installation Verification Audit: Includes the on-site inspection and review of related system components for conformance to the Contract. The CA will check for proper systems installation and verify systems readiness for function testing. Noted deficiencies will be documented and must be satisfactorily resolved prior to continuing with commissioning on the affected component or system.

C. Commissioning Plan: Outlines the commissioning process. Provides a brief overview of each start-up and functional test to be performed and identifies the responsible Contractor and/or supplier. It also outlines the responsibilities of all personnel to the commissioning process, estimates the commissioning schedule and provides sample Installation Verification, Start-Up, and Functional Performance Test Procedures and related documentation for information.

D. Start-Up Testing: Initial test checkout of component or systems completed prior to functional performance testing. The start-up tests verify that the equipment is installed and operating properly per the Contact.

E. Testing, Adjusting and Balancing (TAB): Testing, adjusting and balancing is a process where heating and air conditioning systems are tested against design standards, adjusted for maximum efficiency, and balanced to provide optimum performance. The Work typically covers balancing and adjusting air and water distribution in areas of the building served by an HVAC system, and verification and adjustment of heating and cooling loads to insure proper indoor environmental conditions. Areas that do not meet the design standards are referred to the appropriate party for correction. Reports are prepared documenting performance and compliance with design standards.

F. Function Performance Testing: Includes the documented testing of individual components and equipment under actual operating conditions. Final performance commissioning of systems will begin only after Contractor certifies that system components are 100% complete, start-up test results have been accepted, and the CA agrees that systems are ready for functional testing.

G. Commissioning Issues Log: Generated by the CA, includes deficiencies discovered during the commissioning process. The log identifies the responsible contractor, current disposition of issues, and the date of final resolution as confirmed by the CA. Deficiencies are defined as those issues where products, execution or performance do not satisfy the Contract, the design intent or Owner's need.

H. Final Commissioning Report: Includes the overall final commissioning document, prepared by the CA, which details the actual commissioning procedures performed, inspection and testing results, and the final version of the Commissioning Issues Log indicating that all issues discovered through the commissioning process have been verified as resolved.

1.03 COMMISSIONING AGENT'S DUTIES AND RESPONSIBILITIES

A. Meet and communicate with the Owner's Designated Representative, Contractor, equipment representatives, and others as necessary to facilitate the commissioning process.

B. Write the commissioning plan.

C. Review commissioning-related Specifications, submittals, and Contract Documents. Communicate noted deficiencies and concerns to Owner.

D. Review the Owner Project requirements and Basis of Design documents to insure Owner's intent and design requirements are met.

E. Chair controls integration meetings to ensure acceptance of control strategies and determine methods to achieve the required sequence of operation.

F. Develop installation and start-up checklists from:

1. Information in the Contract Documents; and
2. Information from equipment manufacturers as provided by Contractor.

G. Coordinate functional testing procedures with Contractor and integrate into Progress Schedule.

H. Develop detailed and specific inspection and functional testing procedures for equipment and systems to be commissioned.

I. Confirm completion of all static piping and duct tests and flushing and cleaning as performed by Contractor.

J. Complete a detailed physical inspection and visual checkout of commissioning related equipment and components. Document specific deficiencies for resolution.

K. Confirm completion of equipment and systems start-up procedures as performed by Contractor and equipment representatives. Verify appropriate documentation is completed and provided for inclusion in the final commissioning report. Record noted deficiencies.

L. Schedule and coordinate the final on-site functional testing process. Complete a documented checkout of every specified operating parameter and mode. Document deficiencies and resolutions.

M. Review Contractor-provided O&Ms. Ensure the manuals provide in-depth, Project-specific information. Provide formal comment.

N. Work with Owner, Architect/Engineer, if any, and Contractor to satisfactorily resolve outstanding issues.

O. Provide Owner with final, complete, and documented verification to ensure commissioned systems are 100% operational per Contract, prior to Owner's acceptance. Exceptions may be made for seasonal commissioning.

P. Perform seasonal commissioning as required to verify proper system operation during peak heating and cooling seasons.

Q. Complete all other items noted in Contract as Commissioning Agent responsibilities.

R. Provide a final Commissioning Report to Owner.

1.04 DUTIES AND RESPONSIBILITIES FOR COMMISSIONING

A. The commissioning process will require the active participation of persons qualified to represent the following interests:

1. Owner,
2. Contractor,
3. Equipment manufacturer's representatives,
4. Mechanical Subcontractor,
5. HVAC Subcontractor,
6. Controls Subcontractor,
7. TAB Subcontractor,
8. Electrical Subcontractor, and
9. Others as appropriate.

B. The CA will coordinate, schedule, and oversee the final functional performance commissioning process. Participants shall include in their contracts all costs necessary to participate in and complete the commissioning process.

C. Contractor will assure the participation and cooperation of Subcontractors and coordinate with Owner and Architect/Engineer, as required for the commissioning process.

Owner will assure the participation of its chosen representatives.

PART 2 PRODUCTS − NOT USED

PART 3 EXECUTION

3.01 CONTRACTOR RESPONSIBILITIES FOR COMMISSIONING

A. Contractor shall provide material, equipment, and tools to facilitate completing the functional performance testing process. The CA will provide specialized and calibrated test equipment to perform the calibration and functional performance testing.

B. Contractor shall budget and provide sufficient time and qualified personnel to participate on-site in this process until the process is successfully completed and all deficiencies have been corrected or otherwise revolved.

C. Contractor shall provide training to Owner. Specified training on related systems and equipment operation and maintenance shall only commence after final performance commissioning is successfully completed, and systems are verified by the CA to be 100% complete and functional.

D. Contractor shall reimburse the CA for repeated test failures. After a second failed start-up or functional performance test, the CA and Owner shall be entitled to additional compensation for time and expenses involved with re-testing. The compensation shall be at published company billing rates.

E. Owner will not accept equipment and systems, and Owner will generally not make final payment, until all equipment and systems have been successfully

commissioned and all specified requirements have been satisfied.

F. Include a line item for commissioning in the Schedule of Values. Ensure sufficient costs are included for Contractor's expenses related to all commissioning tasks.

END OF SECTION 01 91 00

PART 1 - GENERAL

1.01 CONDITIONS AND REQUIREMENTS

A. Refer to BIDDING REQUIREMENTS, CONDITIONS OF THE CONTRACT, SUPPLEMENTARY CONDITIONS and DIVISION 1 of these specifications which govern work under DIVISION 23. Refer to other sections of these specifications for additional related requirements.

B. Codes, Permits and Fees:

1. Mechanical work shall be in accordance with the most recent adopted publication of the following:

a. International Building Code

b. International Mechanical Code

c. Uniform Plumbing Code

d. International Fire Code

e. National Electric Code

f. American Disability Act

g. Washington State Energy Code

h. All applicable State and Local Codes and Ordinances.

2. The Contractor shall obtain permits and inspections required for the mechanical work on this project at his expense. Deliver all inspection certificates to the Owner's Representative prior to final acceptance of the work.

3. Contractor(s) shall pay all costs levied by utility companies and/or governing agencies associated with water, gas, sanitary and storm sewer connections and include these costs within his bid. This shall include but not be limited to tap fees, service mains, meters and vault charges.

1.02 DESCRIPTION OF WORK

A. The work covered by the contract documents (specifications and construction drawings), shall include but not be limited to:

1. Furnishing all materials and supplying all labor, equipment and services to install the complete mechanical system as shown on the contract documents and specified herein.

2. All products and materials installed on the project shall be new and in first class condition. Used or resold materials will not be allowed. If requested to verify authenticity of materials the Contractor shall be prepared to produce bill-of-sale invoices.

B. This project has been designed to meet or exceed the minimum requirements of the governing Codes. The Contractor must notify the Owner's Representative in writing of any items in conflict with the Codes prior to signing the contract, or he shall thereafter make any minor adjustments necessary to meet the Codes at no cost to the Owner.

C. The Contractor shall comply with the project close-out requirements as detailed in Division 01, "Closeout Procedures."

D. Safety Measures:

1. The Contractor shall be solely and completely responsible for conditions of the job site, including safety of all persons and property during performance of the work. This requirement applies continuously and is not limited to normal working hours.

2. Provide all required safety measures and consult with the State or Federal safety inspector for interpretation whenever in doubt as to whether safe conditions do or do not exist.

3. Head protection: Where pipe hangers, equipment support angles, etc., are exposed in access ways for any maintenance, cover all such potentially injurious protrusions less than 7'-0" above the floor with padding; secure and permanently fasten, and finish to match adjacent finishes.

1.03 REFERENCES

A. Definitions

1. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.

2. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

3. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

4. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in duct shafts.

5. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

1.04 QUALITY ASSURANCE

A. Materials used under this Contract, unless specifically noted otherwise, shall be new and of the latest and most current model line produced by the manufacturer. Each item of equipment shall conform to the latest Standard Specifications of the American Society for Testing Materials and shall conform to any applicable standards of the United States Department of Commerce.

B. Electrically Driven or Connected Mechanical Equipment:

1. All electrically driven or connected equipment and associated control panels shall be provided with UL or equivalent label and/or listing in accordance with the requirements of the NEC. Equipment shall be listed as an assembly where listing/labeling program is available for that type of equipment.

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

3. All HVAC equipment provided in Division 23 requiring compliance with NEC Article 440 “Air-Conditioning and Refrigerating Equipment” shall be listed for a minimum short-circuit current (AIC) rating of 10,000 Amperes RMS. This equipment shall be listed under UL 1995 for both circuit breakers and fuses as the upstream overcurrent protective device. The nameplate shall read “Maximum overcurrent protective device” not “Maximum Fuse” or “Maximum Circuit Breaker.

4. All Division 23 equipment other than that provided in 2 above shall be listed or rated for a minimum of 10,000 AIC at 240, 208 or 120 volts and 14,000 AIC at 480 or 277 volts unless a higher value is specifically indicated on the drawings or in the specific equipment specifications.

C. AWS states that welding qualifications remain in effect indefinitely unless welding personnel have not welded for more than six months or there is a specific reason to question their ability.

D. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."

1.05 COORDINATION

A. Dimensions are approximate and are for estimating purposes only, unless noted otherwise.

B. The mechanical drawings are diagrammatic and show general locations. Drawings are not to be scaled. Field verify exact size, location, invert, and clearances of existing material and equipment, and advise the Owners Representative of any discrepancies between the field conditions and the Drawings prior to any installation. Contractor shall be responsible for all costs associated with the removal or relocation of systems that have been installed without prior notification of the Owners Representative.

C. Assume all responsibility for fitting of materials and equipment to other parts of equipment and structure.

D. Prior to installation of the new Division 23 systems, the Contractor shall coordinate the proposed installation with the Architectural and Structural requirements and all other trades (including HVAC, Plumbing, Fire Protection, Electrical, Ceiling Suspension and Tile systems), and provide reasonable maintenance access requirements. Changes required in work specified in Division 23 caused by neglect to do so shall be made at no cost to Owner.

E. The Contractor shall be responsible for installation of systems according to the Contract Documents. Anything not clear or in conflict will be explained by making application to Owner's Representative. Should conditions arise where certain changes would be advisable, secure approval from Owner's Representative for those changes before proceeding.

F. Electrical Coordination

1. The electrical characteristics of all mechanical equipment to be furnished on the project shall be cross-checked with the Electrical Drawings, prior to ordering equipment, to confirm correct power supply; horsepower, kW, amps, voltage and phase. Where proposed equipment characteristics do not agree with the Electrical Drawings, the engineer shall be contacted for direction before proceeding.

2. Electrical connection sizes: coordinate with the Electrical Drawings for proper electrical lug size and quantity on large capacity devices such as chillers, electric heaters, etc. and determine if the connections will accept either copper or aluminum conductors. Make necessary adjustments to equipment connections to accommodate electrical power feeder sizes and types.

3. Disconnect Switches: Where disconnect switches are furnished integral with the equipment, mounting height shall not exceed 7 ft. (to top) above floor or roof level, including allowance for bases on roof curbs.

1.06 SUBMITTALS

A. Mechanical Cost Breakdown:

1. The Contractor shall furnish the Owner's Representative an itemized breakdown of the mechanical construction cost within 30 days of notice to proceed. This breakdown shall be utilized for pay applications.

2. At a minimum, the cost breakdown shall be as follows:

a. Mobilization

b. Hydronic Piping

c. Hydronic Equipment

d. Hydronic Labor

e. Temperature Control Material

f. Temperature Control Labor

g. Test and Balance

h. Closeout

B. Payment Requests:

1. Refer to Division 01 for Payment Procedures.

2. Payment requests for materials and equipment will not be reviewed or approved until shop drawings have been received and approved.

C. Submittal Log: Contractor shall prepare a master submittal log tracking spreadsheet for all Division 23 items, to be filled in, updated and furnished with each submittal package. Submittal log shall indicate specification section and sub-paragraph of each item included in the submittal, along with a general description of the item/equipment, manufacturer name, date submitted and a column for returned date, A/E review action (i.e. approved, approved as noted, revise and resubmit or rejected) and re-submittal action required (if any).

D. Submit Shop Drawings and Product Data per the requirements of Division 01 Section, "Submittal Procedures." See individual Division 23 specification sections for additional submittal requirements.

1. Electronic Submittal: Organize electronic files in a similar manner to hard copy binders, with electronic indexing (bookmarks) and/or portfolio format for ease of organizing and navigating for A/E review and comment purposes. SUBMITTALS NOT PROVIDED IN THIS FORMAT WILL BE REJECTED.

E. Shop Drawings: Refer to Division 01 for specific information regarding the preparation, submittal and approval of Shop Drawings.

1. Shop drawings, catalog information and material schedules shall be submitted for approval on all materials and equipment prior to ordering. This applies to all specified material and equipment in Division 23.

2. Shop drawings shall be reviewed, approved and stamped by Contractor prior to submitting to Owner's Representative for approval. Submittals without such approval will be returned without review.

3. Allow for sufficient time for developing shop drawings, processing and review time so that the installation will not be delayed.

4. Indicate manufacturer, trade name and model number. HIGHLIGHT, ENCIRCLE OR OTHERWISE INDICATE ALL DEVIATIONS FROM THE SPECIFIED PRODUCTS OR BASIS-OR-DESIGN EQUIPMENT. Include copies of applicable brochure or catalogue materials. Indicate sizes, types, model numbers, ratings and capacities being proposed. Only those items being used on the project shall be included in the submittal.

5. Where choices of options and accessories are available or specified, provide written description of what is to be furnished. If necessary, list page numbers where submitted items are described.

6. Include dimensional data for roughing in and installation and technical data sufficient to confirm that equipment meets requirements of drawings and specifications.

7. Include wiring, piping and service connection data, motor sizes complete with voltage ratings and schedules. Upon approval, copies of these diagrams shall be forwarded to pertinent contractors.

8. Upon approval, copies of these diagrams shall be forwarded to pertinent contractors

F. Product Data: Refer to Division 01 for specific information regarding preparation, collation, labeling and submittal of Product Data.

1. Clearly identify product data submittal with the project name. Submittals containing resubmitted data shall also include a "Re-submittal" label in bold letters on the cover.

2. Indicate manufacturer, trade name and model number. Include copies of applicable brochure or catalogue material. Indicate sizes, types, model numbers, ratings, capacities and options actually being proposed.

3. Include dimensional data for roughing in and installation, and technical data sufficient to confirm that equipment meets requirements of drawings and specifications.

4. Include wiring, piping and service connection data, motor sizes complete with voltage ratins and schedules.

5. Submit all materials specified in this Division in one pdf binder.

6. Re-submittals shall include all materials being re-submitted in one binder. Only completed re-submittal including all applicable specification sections will be reviewed.

G. If material or equipment is not as specified or submittal is not complete, it will be rejected. Only completed submittal including all applicable specification sections will be reviewed.

H. Review comments shall not relieve Contractor from responsibility for deviations from Contract Documents unless attention has been called to such deviations in writing at time of submission, nor shall they relieve this Contractor from responsibility for errors in items submitted.

1.07 CLOSEOUT SUBMITTALS

A. General: Submit documents to the Owner/Owners Representative for approval prior to Substantial Completion.

B. Record Documents: Construction documents shall be updated to convey a record of the alterations to the original design. Such updates shall include updated drawings red-lined, or redrawn if specified, that show all changes to size, type and locations of components, equipment and assemblies.

C. Mechanical Operating and Maintenance (O&M) Manuals

1. Refer to Division 01 for additional Closeout Submittal and Operation and Maintenance Data requirements.

2. Contents for the Mechanical O&M Manual are to include the following:

a. Title Page: Project Name, Project Number, building name, Architect, Mechanical Engineer, Electrical Engineer and General Contractor.

b. Table of Contents: Complete listing of contents of this O&M Manual. Where multiple volumes are required, provide Master Table of Contents covering all Volumes and place in the front of each volume.

c. Part 1: Listing of all Contractors, subcontractors and suppliers/vendors for all tiers. Information to include: names, addresses, phone numbers, fax numbers and area of work. Also include a copy of the emergency service information required in Division 1.

d. Part 2: Copies of all signed general, mechanical and plumbing permits, and inspection reports.

e. Part 3: Copies of all manufacturer's warranty and guarantee forms, and any specified special guarantees, fully executed.

f. Part 4: Provide a separate sub divider for each applicable Section. Tabs are to be identified by specification section title (i.e. Valves for HVAC Piping) and not just specification section number (i.e. Section 23 05 23). For every Section provide the following:

1) Index listing materials and equipment used.
2) List of suppliers with address, phone number and fax number.
3) Catalog cuts, data sheets, engineering calculations, schedules, wiring diagrams and complete parts lists for all products and equipment incorporated into the Project. Literature shall be clearly marked to indicate each specific item. Include copies of approved submittal data as part of this information.
4) Approved submittal drawings (Option to submit Product Data Submittals as separate Volume(s) if contents are large).
5) Manufacturer's printed operating instructions for all equipment including:
   a) Initial startup procedures and break-in routine.
   b) Normal operating instructions.
   c) Regulation, control, stopping and shutdown.
   d) Troubleshooting and emergency instructions.
   e) Seasonal operating instructions.
6) Cleaning, lubrication and preventative maintenance instructions.
7) Disassembly, repair and reassembly instructions, including alignment and adjustment instructions.
8) Sequence of operation for each system.

g. Part 5: Controls system manufacturer and calibration information, including wiring diagrams, shop drawings, schematics, record documents, and control sequence descriptions. Desired or field determined set-points shall be permanently recorded on control drawings at control devices or, for digital control systems, in system programming instructions.

h. Part 6: Equipment startup records, test records and certifications. Include certification and test results for the disinfection of domestic water piping, and testing of backflow prevention assemblies, pipe pressure testing, duct leak testing and hydronic water treatment flushing and cleaning witness sheets.

i. Part 7: Testing, Adjusting and Balancing Report.

j. Part 8: Spare parts and maintenance materials list. Provide summarized list of spare parts that are to be furnished to the Owner.

k. Part 9: Owner training sign-off sheets.

1.08 PRODUCT DELIVERY, STORAGE AND HANDLING:

A. Refer to Division 01 for Product Storage and Handling Requirements".

B. Follow manufacturer's directions in delivery, storage, protection, and installation of equipment and materials.

C. Promptly notify Owner's Representative in writing of conflicts between requirements of Contract Documents and Manufacturer's directions and obtain written instructions from Owner's Representative before proceeding with work. Contractor shall bear expenses of correcting deficiencies of work that does not comply with manufacturer's directions or such written instructions from Owner's Representative.

D. Deliver equipment and material to site and tightly cover and protect against dirt, water, and chemical or mechanical injury but have readily accessible for inspection. Store items subject to moisture damage in a dry, heated space.

E. Special Storage Requirements:

1. Equipment and products to be stored on the project site either outside or inside but unheated spaces shall be provided with shrink-wrapped coverings and shall be additionally provided with chemical desiccant packs to control any stray moisture that may enter the protective wrapping.

2. Ductwork shall be stored on pallets on grade. Ductwork and air handling equipment shall be kept dry. Air handling equipment that has been allowed to become wet may be rejected.

F. New Equipment and Ductwork Protection:

1. Protect equipment and materials in storage on site, during and after installation until final acceptance. Leave factory covers in place and take special precautions to prevent entry of foreign material into working parts of piping and duct systems.

2. Protect equipment with polyethylene covers and crates.

3. Operate, drain and flush bearings and refill with change of lubricant before final acceptance.

4. Protect bearings and shafts during installation. Grease shafts and sheaves to prevent corrosion. Provide extended nipples for lubrication.

5. During construction, provide temporary closures of metal or taped polyethylene at all openings in new ductwork to prevent construction dust from entering existing ductwork system.

G. Notify Owner of equipment delivery dates 24 hours in advance of delivery.

H. The Contractor shall be responsible for protection of equipment furnished in this Division from vandalism and weather during all phases of construction. Damaged equipment shall be restored to like new condition or replaced at the Contractor's expense.

I. Any factory painted equipment scratched or marred during shipment or construction shall be restored to original "new" condition. This includes complete repainting if necessary to provide exact paint match.

1.09 FIELD CONDITIONS

A. Existing Utilities and Piping:

1. The locations of existing concealed lines and connection points have been indicated as closely as possible from available information. The Contractor shall assume that such connection points are within a Ten foot (10') radius of the indicated location. Where connection points are not within this radius, the Contractor shall contact the Owner's Representative for a decision before proceeding or may proceed at his own expense.

2. Connection points to existing work shall be located and verified prior to starting new work.

3. The Contractor shall be responsible for damages, which might be caused by his failure to exactly locate and preserve underground utilities.

B. Existing Hazardous Materials: Refer to Division 00 for information, instructions, and requirements regarding existing potentially hazardous materials including, but no limited to, asbestos and lead.

1. Specific attention is directed to the potential existence of asbestos bearing compounds and materials on remodel and demolition projects. Careful coordination with other Contractors and reasonable care shall be exercised.

a. Extent of Asbestos:

1) It can be assumed that the Owner will have removed all asbestos from the construction area of this project prior to this contract.
2) An asbestos survey of the building has been performed and reports the extent of asbestos located throughout the building.
3) A copy of the Asbestos Survey is available upon request.

b. If asbestos bearing or other hazardous compounds are encountered during the course of construction that are not identified in the Asbestos Survey, the Contractor shall immediately notify the Owners Representative.

1.10 WARRANTY

A. The Mechanical equipment and installation shall be warranted for a period of one (1) year from the date of acceptance unless an individual item or specification is otherwise noted as longer. The Contractor shall make good, at his own expense, all defects in work and/or furnished equipment which develop at any time during the warranty period and shall bare all expenses including that of cutting and patching.

B. Refer to individual Division 23 specification sections for warranties required to extend beyond the 1-year project warranty period.

PART 2 - PRODUCTS

2.01 SUBSTITUTIONS

A. Refer to Division 01 Substitution Procedures regarding product prior approval and substitution requirements.

B. Throughout these specifications and drawings, various materials, equipment, apparatus, etc., are specified or scheduled by manufacturer, brand name, type or catalog number. Such designation is to establish standards of desired quality and construction and shall be the basis of design and the bid.

C. Substitutions will not be permitted without written approval.

D. Where two or more manufacturer designations are listed in these specifications, choice will be Contractors option.

1. Exception: Where more than one manufacturer is listed, and only one manufacturer's catalog number is specified or only one manufacturer is scheduled on the drawings (basis of design), that standard of quality, dimensional characteristics, capacities, and construction shall be maintained by materials or equipment supplied by the other manufacturer(s).

E. If the Contractor uses manufacturers other than the basis of design, the Contractor shall be responsible for:

1. Insuring the substituted item will perform identical to the basis-of-design equipment, fit in the available space while allowing proper maintenance access. In the event other than specified equipment is used and will not fit job site conditions, the Contractor assumes responsibility for replacement with items indicated as the basis of design.

2. Any changes required by other Contractors caused by the substituted equipment, such as different electrical characteristics, control point requirements, etc.

3. Changes in structural design and/or construction due to weight differences.

F. Products furnished other than the basis of design shall have similar electrical characteristics as the scheduled or specified equipment. Contractor shall be responsible for any electrical changes caused by products not in accordance with this requirement.

2.02 ELECTRICAL MOTORS

A. All electrical motors furnished on the project, whether provided with factory packaged equipment such as pumps, fans, air handlers, fan coil units, etc., or provided separately for field mounting, shall meet or exceed the minimum energy efficiency requirements of Washington State Energy Code.

B. Motors used with Variable Frequency Drives (VFDs): Motors shall be Premium efficiency type NEMA MG 1 Part 31 compliant, Class F insulation, rated as “Inverter Duty”.

C. ECM (Electrically Commutated Motor) type single-phase motors utilized on direct drive applications, shall be ultra-high efficiency type with programmable brushless DC motor, utilizing a permanent magnet rotor and built-in inverter. Permanently lubricated ball bearing design. Provide with integral microprocessor controller for variable speed control (constant torque or external input variable speed control) as indicated.

2.03 ACCESS DOORS

A. Access doors to match surrounding surface, provided with recess to accept matching finish in accordance with the requirements of Division 08. Provide UL rated doors in fire rated construction.

B. Provide flush type steel framed panel with concealed hinges, size minimum 24 x 24 inch for man access and minimum 18 x 18 inch for inspection and hand access.

C. Provide cam type locking device with hand or key lock when located in public corridors and washrooms complete with master keys.

D. Provide access doors for maintenance or adjustments purposes for all mechanical system components including valves, volume dampers, fire dampers, fire/smoke dampers, clean outs, traps and controls.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine premises and understand the conditions which may affect the execution of work of this Division before submitting proposals for this work.

B. No allowance for time or money will be considered for any consequence related to failure to examine existing site conditions.

3.02 INSTALLATION

A. Coordinate Division 23 equipment and systems to the available space, with other trades. The access routes through the construction shall be the Contractor's responsibility.

B. Drawings are diagrammatic. Make offsets, transitions, and changes in direction of pipes and ducts, as required to maintain proper headroom and pitch of sloping lines and avoid structural, electrical, pipe and duct interference's whether or not indicated on Drawings. Furnish fittings, etc., as required to make these offsets, transitions and changes in direction at no additional cost to the Owner.

C. Determine exact route and location of each pipe and duct and coordinate and obtain approval for changes from the layout indicated on the drawings with the Owner's Representative prior to fabrication.

D. Locations of equipment and devices, as shown on the drawings, are approximate unless dimensioned. Verify the physical dimensions of each item of mechanical equipment to fit the available space and promptly notify the Owner's Representative prior to roughing-in if conflicts appear.

E. All piping, wiring, equipment, ductwork, tubing, etc., shall be concealed within building construction unless otherwise noted, or in mechanical rooms.

F. Arrange pipes, ducts, and equipment to permit ready access to valves, unions, traps, trap primers, starters, motors, control components, and to clear openings of doors and access panels.

G. Prior to installation of the new Division 23 systems, the Contractor shall coordinate the proposed installation with the Architectural and Structural requirements, and all other trades (including HVAC, Plumbing, Fire Protection, Electrical, Ceiling Suspension and Tile systems), and provide reasonable maintenance access requirements.

H. Provide means of access to all valves, dampers, controllers, operable devices and other apparatus which may require adjustment or servicing.

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

J. Equipment Installation – Common Requirements:

1. Install equipment in accordance with the manufacturer's instructions. Where the construction documents appear to conflict with the manufacturer's instructions, contact the A/E for direction before proceeding with installation. Rework caused as a result of failing to resolve conflicting information beforehand shall be done at no additional cost to the Owner.

2. Install equipment to allow maximum possible headroom unless specific mounting heights are indicated.

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

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

5. Install equipment to allow for piping to be installed at required slope.

6. Motor and equipment name plates as well as applicable UL and AGA labels shall be in place when the Project is turned over to the Owner.

K. Erection of Metal Supports and Anchorages:

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

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

L. Access Openings for Valves, Dampers, Etc.

1. Provide access doors wherever required to service valves, dampers, fire dampers, motors or any other concealed items requiring access, unless specifically indicated on the drawings to be furnished under other Divisions (i.e., architectural). Access doors for fire dampers shall be installed in duct adjacent to fire damper. Equipment which is accessible by means of removable ceiling panels or tile does not require access doors or panels. Access doors and panels for service and maintenance of items shall be sized and located to allow adequate access for required service.

M. Fire Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials.

N. Switchgear/Electrical Equipment Drip Protection:

1. Every effort shall be made to eliminate the installation of pipe above electrical and telephone switchgear. If this is not possible, encase pipe in a second pipe with a minimum amount of joints.

2. Installation of piping, ductwork, leak protection apparatus or other installations foreign to the electrical installation shall be located in the space equal to the width and depth of the equipment and extending to a height of 1.8 m (6 ft.) above the equipment to ceiling structure, whichever is lower (NFPA 70).

O. Inaccessible Equipment:

1. Where the A/E determines that the Contractor has installed equipment not conveniently accessible for operation and maintenance, equipment shall be removed and reinstalled or remedial action performed as directed at no additional cost to the Owner.

2. The term “conveniently accessible” is defined as capable of being reached without the use of ladders, or without climbing or crawling under or over obstacles such as motors, fans, pumps, belt guards, transformers, high voltage lines, piping, and ductwork.

P. Cutting and Patching:

1. Perform all cutting and patching of new and existing construction required for the installation of systems and equipment specified in Division 23. All cutting shall be accomplished with masonry saws, drills or similar equipment to provide neat uniform openings. Field verify locations for new openings to avoid conflict with new or existing structure, architectural elements or other utilities. Coordinate penetration locations.

2. Patch and repair walls, floors, ceilings and roof with materials of same quality and appearance as adjacent surfaces unless otherwise shown. Surface finishes shall exactly match existing finishes of same materials. All patching shall meet the approval of the Owner’s Representative. Where existing mechanical systems are removed and roof or wall openings are not to be reused for new systems, the Division 23 Contractor shall be responsible for in-filling the abandoned opening per above.

3. All cutting and patching made necessary by defective equipment, defective workmanship or failure of this Contractor to properly anticipate his requirements shall be included.

4. Cut carefully to minimize necessity for repairs to existing work. Do not cut beams, columns, or trusses or other structural members without the Owner Representative’s written approval.

5. Cutting, patching, repairing, and replacing pavement, sidewalks, roads, and curbs to permit installation of work specified or indicated under this Division is included.

Q. Demolition and Salvage:

1. Refer to Division 01 for cutting, patching, waste management and disposal, recycling, reuse and documentation requirements.

2. Comply with all Local, State and EPA requirements for glycol antifreeze and/or refrigerant disposal and/or reclaim.

3. Demolition of mechanical systems and equipment in remodeled areas shall be provided under Division 23.

4. Disconnect, demolish, and remove HVAC systems, equipment, and components indicated to be removed.

    a. Ducts to be removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.

    b. Equipment to be removed: Disconnect and cap services and remove equipment.

    c. Equipment to be removed and reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.

    d. Equipment to be removed and salvaged: Disconnect and cap services and remove equipment and deliver to Owner.

5. If pipe, insulation, or equipment to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

6. Where the plans are not clear on what existing systems are to remain and be reused or retained for later upgrades, the Contractor shall contact the Owner's Representative for direction before proceeding with demolition work.

7. Systems, materials and equipment designated for demolition, shall be salvaged to the Contractor and removed from the site unless otherwise noted.

8. Equipment and materials salvaged to the Owner shall be delivered to an owner approved on-site location.

9. Contractor shall repair any existing equipment damaged as a result of his work.

10. Verify and document condition of existing systems to be connected to prior to construction.

    a. Submit to A/E a list of required equipment repairs due to existing conditions.

    b. Required repairs not documented will be made by the Contractor at his own expense.

11. Contractor's bid shall include re-claim and disposal of refrigerant from existing systems indicated to be removed.

3.03 EQUIPMENT TESTING

A. Equipment Tests: Equipment shall be subject to tests as specified in individual Division 23 specification sections.

B. Demonstrate that the mechanical equipment and systems are performing to provide conditions through all possible modes of operation as outlined below. The verification testing procedures shall address all operating characteristics of all mechanical equipment and systems. Equipment and systems shall be tested in accordance with the manufacturer's requirements and the Commissioning testing requirements.

C. Provide all test equipment, including test pumps, gauges, instruments, and other equipment required. Test all rotational equipment for proper direction of rotation. Upon completion of testing, certify to the Owner's Representative in writing, or as witnessed by the Commissioning Authority, that the specified tests have been performed and that the installation complies with the specified requirements.

1. Provide equipment start-up test reports on forms provided by the manufacturers, filled-in, dated and signed by the authorized start-up agent or technician. Include copies of start-up reports in the O&M manuals.

D. A record similar to the following shall be kept to record each test and copies shall be sent to the Owner's Representative after each test is complete:

EQUIPMENT TESTS:

SYSTEM TESTED	TESTED BY (CO. or MFR)	TESTING AGENT (Name)	DATE
Pumps			
Chiller			
Controls			

3.04 PIPING AND DUCTWORK TESTING

A. Piping and duct systems shall be subject to tests as specified in the applicable Division 23 sections.

B. No piping shall be covered, insulated or concealed until it has been tested, inspected and approved by any local authority having jurisdiction. Isolate systems during testing and flushing.

C. Ductwork systems and specialties shall be subject to testing as specified in the applicable Division 23 sections.

D. Tests and repairs shall be completed prior to concealment or insulation of ducts.

E. Provide all test equipment including test pumps, gauges, instruments and other equipment required. Test all rotating equipment for proper direction of rotation. Upon completion of tests contractor shall certify in writing to the Owner's Representative that the specified tests have been performed and that the installation complies with specifications.

3.05 CLOSEOUT ACTIVITIES

A. Demonstration and Owner Training: Instruct the designated Owners representative(s) in operation and maintenance of mechanical systems utilizing the information and material available in the Operation and Maintenance Manual.

1. Upon completion of the equipment and systems installation and connections, start-up, testing and balancing, and at the end of each Construction Phase, the Contractor shall assemble all major equipment factory representatives and subcontractors together for the Owner instructional period.

   a. Coordinate training schedule in advance with Owner's representative so that the required Owner personnel may be present and also to minimize the number of sessions required and/or return trips by factory agents.

2. Instruction period shall occur after start-up and testing activities have occurred, the controls are operational and when systems are properly working.

3. Prepare statement and check list, similar to below, to be included in the Operation and Maintenance Manual. This Statement shall read as follows:

OWNER TRAINING SIGN-OFF:

"The Contractor, associated factory representatives and subcontractors have started each system and the total system and have proved their normal operation to the Owner's representative and have provided instruction on the operation and maintenance thereof."

DATE: _____

SYSTEM OR EQUIPMENT	TRAINED BY (CO. & NAME)	OWNER'S STAFF (NAMES & SIGNATURES)
_____	_____	_____

4. Copies of this acceptance sign-off sheet shall be sent to the Owner's Representative and included in the O & M manual.

B. Owner Acceptance, Hand-off, Operational & Maintenance Responsibilities & Warranty:

1. Refer to the General Conditions and Division 01 for the definitions or and additional requirements associated with "Prior Occupancy", "Substantial Completion", "Correction on Nonconforming Work", "Final Completion" and "Warranty of Construction", and other project close-out, substantial completion and warranty requirements.

2. Near the end of the project, or at the end of each phase, schedule a meeting with the Owner, A/E, and Temperature Control Contractor, to discuss mechanical system turn-over responsibilities and expectations.

3. Notwithstanding other requirements in the General Conditions and Division 01, once the Owner has taken beneficial occupancy and the mechanical systems have been made operational, tested, and the Owner has received training, it is expected that the Owner will be responsible for ongoing system operations, maintenance and control activities, except as otherwise determined above during the Hand-off meeting.

4. Once the Owner has taken over primary responsibility for the operation and maintenance of the mechanical systems, the Contractor shall still be obligated to complete all outstanding work in accordance with the Contract Documents, including, but not limited to those items as identified in the Commissioning issues logs, punch lists, or other reports, as well as correct all nonconforming work and repair all defective work as identified during the warranty period.

C. Punch List Procedures:

1. Refer to Division 01 Closeout Procedures for general punch list procedures.

2. The project shall be fully cleaned and in all respects ready to turn over to the Owner for occupancy before the Punch List Inspection is requested. This shall include but not be limited to:

   a. Cleaning up all equipment, materials, cartons, and other debris that is a direct result of the installation of equipment under this contract.

   b. Cleaning exposed piping, ductwork, equipment, and fixtures.

   c. Repairing damaged finishes.

3. The Contractor shall notify the Owner's Representative in writing when the project or phase is ready for punch lists. After punch lists are complete, written notice must be forwarded to the Owner's Representative requesting final checkout.

4. At the time of final observation, the contractor shall accompany the observation party and shall remove access panels as required, to allow complete observation of the entire mechanical system.

END OF SECTION 23 00 00

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes basic requirements for field-installed motors. Motors included with specified equipment are included in those specs sections.

B. Related Sections: 23 09 26 “Variable Frequency Drives”.

1.02 SUBMITTALS

A. Product Data for Field-Installed Motors: For each type and size of motor, provide nameplate data and ratings; shipping, installed, and operating weights; enclosure type and mounting arrangements; size, type, and location of winding terminations; conduit entry and ground lug locations; and information on coatings or finishes.

B. Shop Drawings for Field-Installed Motors: Dimensioned plans, elevations, sections, and details, including required clearances and service space around equipment. Include the following:

1. Each installed unit's type and details.

2. Nameplate legends.

3. Diagrams of power, signal, and control wiring. Provide schematic wiring diagram for each type of motor and for each control scheme.

C. Field quality-control test reports.

D. Operation and Maintenance Data.

1.03 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with NFPA 70.

1.04 COORDINATION

A. Field verify existing mounting configurations and frame sizes for existing motors to be replaced with new motors. Provide new motors/mounts compatible with existing mounts or modify existing as required to accommodate new motors.

B. Coordinate features of motors, installed units, and accessory devices and features that comply with the following:

1. Compatible with the following:
   a. Magnetic controllers.
   b. Multispeed controllers.
   c. Reduced-voltage controllers.
   d. Motor Control Centers.

2. Motors for use with variable frequency drives shall meet all requirements of drive manufacturer, and shall be suitable for use throughout speed range without overheating.

3. Matched to torque and horsepower requirements of the load.

4. Matched to ratings and characteristics of supply circuit and required control sequence.

C. Coordinate motor support with requirements for driven load; access for maintenance and motor replacement; installation of accessories, belts, belt guards; and adjustment of sliding rails for belt tensioning.

1.05 WARRANTY

A. Provide three (3) year warranty, parts and labor, on all motors.

PART 2 - PRODUCTS

2.01 FIELD INSTALLED MOTOR REQUIREMENTS

A. Manufacturers:

1. Toshiba EQP III.

2. Century

3. US Motors

4. Baldor

5. Marathon

6. General Electric

7. Toshiba

8. Westinghouse.

B. All motors shall be Energy Efficient Electric Motors. The minimum nominal full-load efficiency for motors shall comply with the latest edition of the Washington State Energy Code and/or Table 10.8A/B/C of ASHRAE 90.1 - 2010, whichever is the most stringent.

2.02 MOTOR CHARACTERISTICS

A. Motors 3/4 HP and Larger: Three phase.

B. Frequency Rating: 60 Hz.

C. Voltage Rating: NEMA standard voltage selected to operate on nominal circuit voltage to which motor is connected.

D. Service Factor: Three phase motors shall have a service factor of 1.15 or higher.

E. Duty: Continuous duty at ambient temperature of 105 deg F and at altitude of 3300 feet above sea level.

F. Capacity and Torque Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, at installed altitude and environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor.

2.03 POLYPHASE MOTORS

A. Description: NEMA MG 1, Design B, medium induction motor.

B. Efficiency: Premium, as defined in NEMA MG 1.

C. Stator: Copper windings, unless otherwise indicated.

1. Multispeed motors shall have separate winding for each speed.

D. Rotor: Squirrel cage, unless otherwise indicated.

E. Bearings: Double-shielded, pre-lubricated ball bearings suitable for radial and thrust loading.

F. Temperature Rise: Match insulation rating, unless otherwise indicated.

G. Insulation: Class F, unless otherwise indicated.

H. Code Letter Designation:

1. Motors 15 HP and Larger: NEMA starting Code F or Code G.

2. Motors Smaller Than 15 HP: Manufacturer's standard starting characteristic.

I. Enclosure: Cast iron for motors 7.5 hp and larger; rolled steel for motors smaller than 7.5 hp.

2.04 POLYPHASE MOTOR ADDITIONAL REQUIREMENTS

A. Motors Used with Reduced-Inrush Controllers: Match wiring connection requirements for controller with required motor leads. Provide terminals in motor terminal box, suited to control method.

B. Motors Used with Variable Frequency Drive (VFD) Controllers: Ratings, characteristics, and features coordinated with and approved by controller manufacturer.

1. Inverter Duty Rated.

2. Designed with critical vibration frequencies outside operating range of controller output.

3. Temperature Rise: Matched to rating for Class F insulation.

4. Insulation: Class F.

5. Thermal Protection: Comply with NEMA MG 1 , Part 31 requirements for thermally protected motors.

C. Source Quality Control for Field-Installed Motors: Perform the following tests on each motor according to NEMA MG 1:

1. Measure winding resistance.

2. Read no-load current and speed at rated voltage and frequency.

3. Measure locked rotor current at rated frequency.

4. Perform high-potential test.

PART 3 - EXECUTION

3.01 FIELD-INSTALLED MOTOR INSTALLATION

A. Anchor each motor assembly to base, adjustable rails, or other support, arranged and sized according to manufacturer's written instructions. Attach by bolting. Level and align with load transfer link.

B. Coordinate with existing fan and motor pulleys and belts to ensure they are sized to match motor and fan speed at 150% rated motor HP requirements and to match shaft and keyways.

3.02 FIELD QUALITY CONTROL FOR FIELD-INSTALLED MOTORS

A. Prepare for acceptance tests.

1. Align motors, bases, shafts, pulleys, and belts to drive suppliers installation/operating requirements. Tension belts according to manufacturer's written instructions.

2. Verify bearing lubrication.

3. Run each motor with its controller. Demonstrate correct rotation, alignment, and speed at motor design load.

4. Test interlocks and control and safety features for proper operation.

5. Verify that current and voltage for each phase comply with nameplate rating and NEMA MG 1 tolerances.

B. Perform the following field tests and inspections and prepare test reports:

1. Perform electrical tests and visual and mechanical inspections including optional tests and inspections stated in NETA ATS on factory and field-installed installed motors. Certify compliance with test parameters.

2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

END OF SECTION 23 05 13

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes TAB to produce design flows for the following:

1. New and existing hydronic systems

2. Verifying that automatic control devices are functioning properly.

B. Reporting results of activities and procedures specified in this Section.

1.02 COORDINATION

A. Coordinate the efforts of factory-authorized service representatives for systems and equipment, HVAC controls installers, and other mechanics to operate HVAC systems and equipment to support and assist TAB activities.

B. Perform TAB after leakage and pressure tests on air and water distribution systems have been satisfactorily completed.

C. Provide formal progress reports and deficiency reports.

D. Communicate in writing all set-point and parameter changes made or problems and discrepancies identified during TAB that affect the control system setup and operation.

E. Provide a draft TAB report prior to completion. The report will contain a full explanation of the methodology, assumptions and the results in a clear format with designations of all uncommon abbreviations and column headings.

1. Provide a list of all components and systems that perform out of specified parameters.

2. Provide any requested data, gathered, but not shown on the draft reports.

F. Provide a final TAB report for the Owner's Representative and with details. Provide final information as requested in draft TAB report.

1. Identify the following:
   a. Systems or subsystems for which final balancing is complete.
   b. Status of deficiencies and balancing issues encountered, including corrective actions taken.
   c. Plan & Schedule for completion of unfinished work.

1.03 SUBMITTALS

A. Strategies and Procedures Plan:

1. The submitted plan will include:
   a. Certification that the TAB contractor has reviewed the construction documents and the systems with the design engineers and contractors to sufficiently understand the design intent for each system.
   b. An explanation of the intended use of the DDC. The controls contractor will comment on feasibility of the plan.
   c. All field checkout sheets and logs to be used that list each component to be tested, adjusted and balanced with the data cells to be gathered for each.
   d. Discussion of what notations and markings will be made on the duct and piping drawings during the process.
   e. Final test report forms to be used.
   f. Detailed step-by-step procedures for TAB work for each system and issue: terminal flow calibration (for each terminal type), diffuser proportioning, branch / sub-main proportioning, total flow calculations, rechecking, diversity issues, expected problems and solutions, etc.
   g. List of all airflow, water flow, system capacity and efficiency measurements to be performed.
   h. Details of how total flow will be determined (Air: sum of terminal flows via DDC calibrated readings or via hood readings of all terminals, supply (SA) and return air (RA) pitot traverse, SA or RA flow stations. Water: pump curves, circuit setter, flow station, ultrasonic, etc.).
   i. The identification and types of measurement instruments to be used and their most recent calibration date.
   j. Confirmation that TAB understands the outside air ventilation criteria under all conditions.
   k. Details of whether and how minimum outside air cfm will be verified and set, and for what level (total building, zone, etc.).
   l. Details of how building static and exhaust fan / relief damper capacity will be checked.
   m. Details of any TAB work to be done in phases (by floor, etc.), or of areas to be built out later.
   n. Details regarding specified deferred or seasonal TAB work.
   o. Details of any specified false loading of systems to complete TAB work.

B. Certified TAB Reports: Submit two copies of reports prepared, as specified in this Section, on approved forms certified by TAB firm.

1.04 QUALITY ASSURANCE

A. TAB Firm Qualifications: An independent testing, adjusting, and balancing agency certified by National Environmental Balancing Bureau (NEBB) in those testing and balancing disciplines specified for this project.

B. Pre-approved balancing contractors are:

1. Air Commander

2. TestComm

3. Riley Engineering

C. Report Certification: Certify TAB field data reports in accordance with NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems, 5.2.2 Report Certification." This certification includes the following:

1. Review field data reports to validate accuracy of data and to prepare certified TAB reports.

2. Certify that TAB team complied with approved TAB plan and the procedures specified and referenced in this Specification.

D. TAB Report Forms: Use standard forms from NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems."

E. NEEB's Quality Assurance Program (QAP): TAB work shall be performed in accordance with NEBB standards. The certified TAB firm will make application to the NEBB Office for a Certificate of Conformance Certification.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems' designs that may preclude proper TAB of systems and equipment.

B. Examine approved submittal data of HVAC systems and equipment.

C. Examine equipment performance data including fan and pump curves. Relate performance data to Project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system. Calculate system effect factors to reduce performance ratings of HVAC equipment when installed under conditions

different from those presented when the equipment was performance tested at the factory. To calculate system effects for air systems, use tables and charts found in AMCA 201, "Fans and Systems," Sections 7 through 10; or in SMACNA's "HVAC Systems--Duct Design," Sections 5 and 6. Compare this data with the design data and installed conditions.

D. Examine system and equipment installations to verify that they are complete and that testing, cleaning, adjusting specified in individual Sections have been performed.

E. Examine HVAC system and equipment installations to verify that indicated balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers, are properly installed, and that their locations are accessible and appropriate for effective balancing and for efficient system and equipment operation.

F. Examine systems for functional deficiencies that cannot be corrected by adjusting and balancing.

G. Examine HVAC equipment to ensure that clean filters have been installed, bearings are greased, belts are aligned and tight, and equipment with functioning controls are ready for operation.

H. Examine Fan Coil Units to verify that they are accessible and their controls are connected and functioning.

I. Examine strainers for clean screens and proper perforations.

J. Examine system pumps to ensure absence of entrained air in the suction piping.

K. Examine equipment for installation and for properly operating safety interlocks and controls.

L. Examine automatic temperature system components to verify the following:

1. Dampers, valves, and other controlled devices are operated by the intended controller.

2. Dampers and valves are in the position indicated by the controller.

3. Integrity of valves and dampers for free and full operation and for tightness of fully closed and fully open positions. This includes dampers in multizone units, mixing boxes, and variable-air-volume terminals.

4. Automatic modulating and shutoff valves, including two-way valves and three-way mixing and diverting valves, are properly connected.

5. Thermostats are located to avoid adverse effects of sunlight, drafts, and cold walls.

6. Sensors are located to sense only the intended conditions.

7. Sequence of operation for control modes is according to the Contract Documents.

8. Controller set points are set at indicated values.

9. Interlocked systems are operating.

10. Changeover from heating to cooling mode occurs according to indicated values.

M. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

N. If conditions are discovered that prevent the Testing Agent from performing the test, the Testing Agent shall notify MSI Engineers (509-624-1050) prior to leaving the site.

3.02 PREPARATION

A. Complete system readiness checks and prepare system readiness reports. Verify the following:

1. Permanent electrical power wiring is complete.

2. Hydronic systems are filled, clean, and free of air.

3. Automatic temperature-control systems are operational.

4. Equipment and duct access doors are securely closed.

5. Balance, combination fire & smoke, and fire dampers are open.

6. Isolating and balancing valves are open and control valves are operational.

7. Ceilings are installed in critical areas where air-pattern adjustments are required and access to balancing devices is provided.

8. Windows and doors can be closed so indicated conditions for system operations can be met.

3.03 GENERAL PROCEDURES FOR TESTING AND BALANCING

A. Perform testing and balancing procedures on each system according to the procedures contained in NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems" and this Section.

1. Where conditions or situations arise that are not covered by the standards, or where system dynamics and performances are not as intended or expected, the Engineer reserves the right to modify the NEBB TAB procedures and standards for the benefit of the final system operation. The balancing agency shall seek guidance from the Engineer when such conditions develop.

B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary to allow adequate performance of procedures. After testing and balancing, close probe holes and patch insulation with new materials identical to those removed. Restore vapor barrier and finish according to Specifications.

C. Mark equipment and balancing device settings with paint or other suitable, permanent identification material, including damper-control positions, valve position indicators, fan-speed-control levers, and similar controls and devices, to show final settings.

D. Phased work: This project is a phased and occupied project, which will require multiple periods of system completion, start-up, testing and balancing.

3.04 GENERAL PROCEDURES FOR HYDRONIC SYSTEMS

A. Prepare test reports with pertinent design data and number in sequence starting at pump to end of system. Check the sum of branch-circuit flows against approved pump flow rate. Correct variations that exceed plus or minus 5 percent.

B. Prepare hydronic systems for testing and balancing according to the following, in addition to the general preparation procedures specified above:

1. Open all manual valves for maximum flow.

2. Check flow-control valves for specified sequence of operation and set at indicated flow.

3. Set system controls so automatic valves are wide open to heat exchangers.

4. Check pump-motor load. If motor is overloaded, throttle main flow-balancing device so motor nameplate rating is not exceeded.

5. Check air vents for a forceful liquid flow exiting from vents when manually operated.

C. Measure water flow at pumps. Use the following procedures, except for positive-displacement pumps:

1. Verify impeller size by operating the pump with the discharge valve closed. Read pressure differential across the pump. Convert pressure to

head and correct for differences in gage heights. Note the point on manufacturer's pump curve at zero flow and verify that the pump has the intended impeller size.

2. Check system resistance. With all valves open, read pressure differential across the pump and mark pump manufacturer's head-capacity curve. Adjust pump discharge valve until indicated water flow is achieved.

3. Verify pump-motor brake horsepower. Calculate the intended brake horsepower for the system based on pump manufacturer's performance data. Compare calculated brake horsepower with nameplate data on the pump motor. Report conditions where actual amperage exceeds motor nameplate amperage.

4. Report flow rates that are not within plus or minus 5 percent of design.

D. Set calibrated balancing valves, if installed, at calculated presettings.

E. Motors Driven by Variable-Frequency Controllers: Test for proper operation at speeds varying from minimum to maximum. Test the manual bypass for the controller to prove proper operation. Record observations, including controller manufacturer, model and serial numbers, and nameplate data.

3.05 PROCEDURES FOR TEMPERATURE MEASUREMENTS

A. During TAB, report the need for adjustment in temperature regulation within the automatic temperature-control system.

B. Measure indoor wet- and dry-bulb temperatures every other hour for a period of two successive eight-hour days, in each separately controlled zone, to prove correctness of final temperature settings. Measure when the building or zone is occupied.

C. Measure outside-air, wet- and dry-bulb temperatures.

3.06 TEMPERATURE-CONTROL VERIFICATION

A. Verify that controllers are calibrated and commissioned.

B. Check transmitter and controller locations and note conditions that would adversely affect control functions.

C. Record controller settings and note variances between set points and actual measurements.

D. Check the operation of limiting controllers (i.e., high- and low-temperature controllers).

E. Check free travel and proper operation of control devices such as damper and valve operators.

F. Check the sequence of operation of control devices. Note air pressures and device positions and correlate with airflow and water flow measurements. Note the speed of response to input changes.

G. Check the interaction of electrically operated switch transducers.

H. Check the interaction of interlock and lockout systems.

I. Check main control supply-air pressure and observe compressor and dryer operations.

J. Record voltages of power supply and controller output. Determine whether the system operates on a grounded or nongrounded power supply.

K. Note operation of electric actuators using spring return for proper fail-safe operations.

3.07 TOLERANCES

A. Set HVAC system airflow and water flow rates within the following tolerances:

1. Supply, Return, and Exhaust Fans and Equipment with Fans: Plus or minus 10 percent.

2. Air Outlets and Inlets: Plus or minus 10 percent.

3. Heating-Water Flow Rate: Plus or minus 10 percent.

4. Cooling-Water Flow Rate: Plus or minus 5 percent.

3.08 FINAL REPORT

A. General: Provide electronic pdf reporttabulated and divided into sections by tested and balanced systems.

B. Include a certification sheet in front of binder signed and sealed by the certified testing and balancing engineer.

1. Include a list of instruments used for procedures, along with proof of calibration.

C. Final Report Contents: In addition to certified field report data, include the following:

1. Pump curves.

2. Manufacturers' test data.

3. Field test reports prepared by system and equipment installers.

4. Other information relative to equipment performance, but do not include Shop Drawings and Product Data.

D. General Report Data: In addition to form titles and entries, include the following data in the final report, as applicable:

1. Title page.

2. Name and address of TAB firm.

3. Project name.

4. Project location.

5. Architect's name and address.

6. Engineer's name and address.

7. Contractor's name and address.

8. Report date.

9. Signature of TAB firm who certifies the report.

10. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.

11. Summary of contents including the following:
    a. Indicated versus final performance.
    b. Notable characteristics of systems.
    c. Description of system operation sequence if it varies from the Contract Documents.

12. Nomenclature sheets for each item of equipment.

13. Data for terminal units, including manufacturer, type size, and fittings.

14. Notes to explain why certain final data in the body of reports varies from indicated values.

15. Test conditions for fans and pump performance forms including the following:
    a. Settings for outside-, return-, and exhaust-air dampers.
    b. Conditions of filters.
    c. Cooling coil, wet- and dry-bulb conditions.
    d. Face and bypass damper settings at coils.

e. Fan drive settings including settings and percentage of maximum pitch diameter.
f. Settings for supply-air, static-pressure controller.
g. Other system operating conditions that affect performance.

3.09 TRAINING

A. TAB shall meet with Owner's personnel after completion of TAB and instruct them on the following:

1. Final TAB report, explaining the layout and meanings of each data type.

2. Any outstanding deficient items in control, ducting or design that may affect the proper delivery of air or water.

3. Identify and discuss any terminal units, duct runs, diffusers, coils, fans and pumps that are close to or are not meeting their design capacity.

4. Discuss any temporary settings and steps to finalize them for any areas that are not finished.

5. Other salient information that may be useful for facility operations, relative to TAB.

3.10 ADDITIONAL TESTS

A. Seasonal Periods: If initial TAB procedures were not performed during near-peak summer and winter conditions, perform additional testing, inspecting, and adjusting during near-peak summer and winter conditions.

END OF SECTION 23 05 93

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes insulation requirements for hydronic piping and associated equipment.

1.02 REFERENCES

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

B. ASTM International:

1. ASTM B209 – Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

2. ASTM C411 – Standard Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation.

3. ASTM C534 – Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form.

4. ASTM C547 – Standard Specification for Mineral Fiber Pipe Insulation.

5. ASTM C585 – Standard Practice for Inner and Outer Diameters of Thermal Insulation for Nominal Sizes of Pipe and Tubing.

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 C1104 – Standard Test Method for Determining the Water Vapor Sorption of Unfaced Mineral Fiber Insulation.

9. ASTM C1136 – Standard Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation.

10. ASTM C1338 – Standard Test Method for Determining Fungi Resistance of Insulation materials and Facings.

11. ASTM E84 (NFPA 255) – Standard Test Method for Surface Burning Characteristics of Building Materials.

C. Underwriters Laboratories (UL):

1. UL 723 – Test for Surface Burning Characteristics of Building Materials.

1.03 SUBMITTALS

A. Product Data: Provide product data for each type of insulation product indicated.

B. Shop Drawings: Show details for the following:

1. Application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.

2. Insulation application at elbows, fittings, flanges, valves, and specialties for each type of insulation.

3. Removable insulation at piping specialties, valves, equipment connections, and access panels.

4. Application of field-applied jackets.

C. Insulation Schedule: Provide a schedule indicating insulation type and thickness and equivalent R-value for each mechanical system to be insulated. Indicate jacketing type to be utilized.

1.04 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of mechanical insulation products, of types and sizes required, whose products have been in satisfactory use in similar services for not less than 10 years.

B. Installer's Qualifications: Firms with at least 5 years successful installation experience on projects with mechanical insulation systems similar to that required for this project.

C. Flame/Smoke Ratings: Provide composite mechanical insulation (insulation, jackets, coverings, sealers, mastics and adhesives) with flame-spread index of 25 or less, and smoke developed index of 50 or less, as tested by ASTM E84 (NFPA 255) method.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

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

1. Armacell LLC

2. CertainTeed Corp.

3. Foster Products Corp.

4. IMCOA

5. Johns Manville Products Corp.

6. Knauf Fiber Glass GmbH.

7. Owens-Corning Fiberglas Corp.

8. Pittsburgh Corning Corp.

2.02 PIPING INSULATION MATERIALS

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

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

C. Pipe Fittings:

1. Fitting Insulation: Fittings, elbows, tees, unions, etc. shall be molded fiberglass fabricated specifically for pipe size, type, and adjacent insulation thickness. Only molded products are acceptable. Equal to Johns Manville Hi-Lo temperature fiber glass insulation inserts.

D. Insulation Fitting Covers:

1. Subject to compliance with requirements, provide one of the following products or approved equal:
   a. Johns Manville Zeston 2000
   b. Speedline Smoke-Safe

2. One-piece premolded 0.020” thick white PVC fitting covers fastened as per manufacturer’s recommendations with fiberglass inserts.

2.03 PIPE INSULATION JACKETS

A. PVC Pipe Insulation Jackets:

1. Subject to compliance with requirements, provide one of the following products or approved equal:
   a. Johns Manville Zeston 2000
   b. Speedline Smoke-Safe

2. For interior applications, premolded 0.020” thick white PVC wrap covers fastened as per manufacturer’s recommendations.

B. Aluminum jacket pipe insulation shall be 0.016" (0.4MM) thick, stucco embossed finish, with a one mil polyethylene film/forty pound kraft paper integral vapor barrier affixed to the interior of the cover in conformance with ASTM B209. Elbows and fittings shall be jacketed with pre-formed 0.024" thick aluminum covers, with moisture retarder film.

2.04 THERMAL-HANGER SHIELD INSERTS

A. Description: High density compressive-strength insulation insert encased in sheet metal shield. Compressive strength varies (25 to 100 psi) based on insulation material selected and shall be as required to accommodate various hanger types, pipe sizes and materials, and associated loading. Flame/smoke rated at 25/50 for plenum applications. Minimum R-Value per 1" thickness shall be 2.5 for calcium silicate and 5.0 for cellular glass or phenolic insulations.

B. Refer to Section Hangers and Supports for HVAC Piping and Equipment for shield insert requirements.

2.05 PIPE INSULATION REMOVABLE VALVE AND FITTING COVERS

A. Valves and devices subject to service or operational needs shall be insulated with removable type covers. These include: Shut-off valves, balance valves (manual and automatic), control valves, venturis and strainers.

B. Valves sets at terminal unit and air handling unit coil connections shall be covered with pre-insulated valve wraps equal to "No-Sweat" reusable and removable covers. Valve wraps shall consist or 1" thick insulation with a durable vapor barrier jacket material and Velcro closures. Field or shop fabricated valve wraps for terminal unit and smaller AHU valve sets are NOT acceptable.

C. Larger body valves, strainers, etc. shall be covered with custom made or pre-manufactured removable covers utilizing PTFE Fiberglass Composite Jacketing, 16.5 oz/sq. yd minimum density, inside and outside face, or Silcone-coated F.G. cloth with S.S. mesh inner lining, both with fiberglass insulation fill. Assembly shall be double sewn lock stitch with minimum 4 to 6 stitches per inch. Jackets shall be fasteners using hook and loop (Velcro) straps and 1" slide buckles or S.S. lacing hooks with Teflon-coated F.G. drawstrings.

D. Flex hose connections on the chilled water coil connections to terminal units shall be covered with ½" thick elastomeric foam, pre-molded pipe sections, for condensation control.

2.06 EQUIPMENT INSULATION MATERIALS

A. Rigid fiberglass equipment insulation shall conform to ASTM C612, Class 2, 6.0 PCF density, K = 0.23 @ 75° F mean temperature. Cover insulation with pre-sized glass cloth jacketing material, not less than 7.8 ounces per square yard. Provide a trowl or glove grade water based purpose mastic (white or light gray)

suitable for interior or exterior applications. Install per manufacturer's written installation instructions.

B. Elastomeric Insulation: ASTM C534, Type 1, ASTM E84, NFPA 255, UL 723, K = 0.27 @ 75° F mean temperature, equal to Armaflex.

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

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

PART 3 - EXECUTION

3.01 HVAC PIPING INSULATION

A. Provide insulation for the following piping:

Pipe Insulation Systems			
Pipe Service	**Location**	**Insulation Type**	**Insulation Cover[1]**
Heating & Chilled Water	Building Interior	Fiberglass	ASJ
Steam and Steam Condensate	Building Interior	Fiberglass	ASJ
Condensate Drains	Building Interior	None	N/A

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

B. Provide minimum pipe insulation as listed in following table (based on Washington State Energy Code):

Pipe Service	Fluid Design Operating Temp. Range, °F	Insulation Conductivity		Nominal Pipe Diameter (in.)				
		Conductivity Range BTUxin/(hxft²x °F)	Mean Rating Temp. °F	< 1	1 to < 1.5	1.5 to < 4	4 to < 8	≥ 8
				Nominal Insulation Thickness				
Chilled Water	40 – 60	0.23 – 0.27	75	0.5	0.5	1.0	1.0	1.5

1. The Minimum Pipe Thickness chart shall be used for insulations with the scheduled 'k' values. Insulation thickness of insulation with k values outside of the schedule (i.e. calcium silicate) shall be computed via the formula noted in Washington State Energy Code.

2. For piping systems smaller than 1-1/2” and located in partitions in conditioned spaces, reductions of the listed thickness by 1 inch shall be permitted, but not less than 1 inch minimum.

C. HVAC piping system insulation omitted on steam traps on condensate piping between steam trap and union, hot piping within radiation enclosures or unit cabinets; on cold piping within unit cabinets provided piping is located over drain pan; and on unions, flanges, flexible connections, and expansion joints.

3.02 EQUIPMENT INSULATION

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

1. Cold and chilled water pump impeller housings.

B. Insulate each item of equipment specified above with one of the following types and thicknesses of insulation:

1. Elastomeric: 2” thick for refrigeration piping and devices in chilled water piping systems.

3.03 COMMON INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of equipment, ducts and fittings, and piping including fittings, valves, and specialties.

B. Install insulation with tightly butted joints free of voids and gaps. Vapor barriers shall be continuous. Before installing jacket material, install vapor-barrier system.

C. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of equipment, duct system, and pipe system as specified in insulation system schedules.

D. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

E. Install insulation with longitudinal seams at top and bottom of horizontal runs.

F. Install multiple layers of insulation with longitudinal and end seams staggered.

G. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.

H. Keep insulation materials dry during application and finishing.

I. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

J. Install insulation with least number of joints practical.

K. Hangers and Anchors: Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.

1. Install insulation continuously through hangers and around anchor attachments.

2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.

3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.

4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.

L. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

M. Install insulation with factory-applied jackets as follows:

1. Draw jacket tight and smooth.

2. Cover circumferential joints with 3-inch- wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.

3. Overlap jacket longitudinal seams at least 1-1/2 inches. Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 2 inches o.c.
   a. For below ambient services, apply vapor-barrier mastic over staples.

4. Cover joints and seams with tape as recommended by insulation material manufacturer to maintain vapor seal.

5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to duct and pipe flanges and fittings.

N. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.

O. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

P. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

Q. For above ambient services, do not install insulation to the following:

1. Vibration-control devices.

2. Testing agency labels and stamps.

3. Nameplates and data plates.

4. Manholes.

5. Handholes.

6. Cleanouts.

3.04 PENETRATIONS

A. Insulation Installation at Below-Grade Exterior Wall Penetrations: Terminate insulation flush with sleeve seal. Seal terminations with flashing sealant.

B. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

C. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions. Terminate insulation at fire damper sleeves for fire-rated wall and partition penetrations. Externally insulate damper sleeves to match adjacent insulation and overlap duct insulation at least 2 inches.

1. Firestopping and fire-resistive joint sealers are specified in Division 07, Section "Firestopping."

D. Insulation Installation at Floor Penetrations:

1. Duct: Install insulation continuously through floor penetrations that are not fire rated. For penetrations through fire-rated assemblies, terminate insulation at fire damper sleeves and externally insulate damper sleeve beyond floor to match adjacent duct insulation. Overlap damper sleeve and duct insulation at least 2 inches.

2. Pipe: Install insulation continuously through floor penetrations.

3. Seal penetrations through fire-rated assemblies according to Division 07, Section "Firestopping."

3.05 INSTALLATION OF HOT PIPING INSULATION

A. After installation and pressure/leak testing of piping systems, install insulation products in accordance with manufacturer's written instructions, and in accordance with recognized industry practices to ensure that insulation serves its intended purpose.

B. Maintain integrity of vapor barrier jacket on pipe insulation, and protect to prevent puncture or other damage.

C. Cover valves, fittings, and similar items in each piping system ≤ 2" with equivalent thickness and composition of insulation as applied to adjoining pipe run. PVC Pipe fittings shall be utilized at all fittings.

D. Install removable covers on all valves, flow balance devices, strainers, etc.

E. Extend Piping insulation without interruption through walls, floors and similar piping penetrations, except where penetrations go through fire rated construction.

F. Cover exposed ends of fiberglass with a vapor retardant mastic.

G. Butt pipe insulation against pipe hanger insulation inserts. Apply 3" wide vapor barrier tape or band over the butt joints.

H. Fasten aluminum jacket to insulation using strapping and wing seals of the same material as the cover. In exterior applications, insure that all seams are watertight. Follow manufacturer's written installation guidelines.

I. For all hot water (above ambient) hydronic heating piping, install thermal-hanger shield inserts per Section Hangers and Supports for HVAC Piping.

J. For steam piping, install thermal-hanger shield inserts or metal pipe saddles (when indicated) per Section Hangers and Supports for HVAC Piping.

3.06 INSTALLATION OF COLD PIPING INSULATION

A. After installation and leak/pressure testing is completed, install insulation products in accordance with manufacturer's written instructions, and in accordance with recognized industry practices in ensure that insulation serves its intended purpose. Insulation must be applied so there are no voids between the inner insulation face and cold piping system. The insulation system and vapor barrier must be installed in such a manner that the piping system will not condense.

B. Maintain integrity of vapor barrier jackets on pipe insulation, and protect to prevent puncture or other damage. Special care must be made to maintain the vapor barrier at PVC fittings and with pipe covered with aluminum jackets.

C. Cover valves, fitting and similar items in each piping system with insulation as applied to adjoining pipe run. Extra care must be taken on piping appurtenances

to insure a tight fit to the adjoining fiberglass system insulation. Pump impeller housings, air separators, etc. must be totally encapsulated with insulation.

1. Install fabricated molded insulation inserts at the pipe fittings under the PVC fitting.

D. Install removable covers on all valves, flow balance devices, strainers, etc.

E. Extend piping insulation without interruption through walls, floors and similar piping penetrations, except where penetrations go through fire rated construction. At fire rated construction, stop insulation at each side of the penetration, fill the interstitial space between the fire caulk with mineral wall (or other approved material), and seal penetration to maintain fire rating.

F. Cover exposed ends of fiberglass with a vapor retardant mastic.

G. Elastomeric Insulation:

1. Glue the butt ends of insulation to each other to form a homogenous membrane maintaining the vapor barrier.

2. Exterior elastomeric insulation shall be installed with the longitudinal seam on the bottom of the pipe and shall be protected with an ultra violet resistive paint.

H. Butt pipe insulation against pipe hanger insulation inserts. Apply wet coat of vapor barrier lap cement on butt joints and over staples and seal joints with 3” wide vapor barrier tape or band.

I. Fasten aluminum jacket to insulation using strapping and wing seals of the same material as the cover. In exterior applications, insure that all seams are watertight. Follow manufacturer’s written installation guidelines.

J. For all cold or chilled water (below ambient) hydronic piping, install thermal-hanger shield inserts per Section Hangers and Supports for HVAC Piping.

3.07 INSTALLATION OF EQUIPMENT INSULATION

A. Install equipment thermal insulation products in accordance with manufacturer’s written instructions, and in compliance with recognized industry practices to ensure that insulation serves the intended purpose.

B. Install insulation materials with smooth and even surfaces and on clean and dry surfaces. Redo poorly fitted joints. Do not us mastic or joint sealer as filler for gapping joints and excessive voids resulting from poor workmanship

C. Maintain integrity of vapor barrier on equipment insulation and protect it to prevent puncture or other damage.

D. Do not apply insulation to equipment while hot.

E. Apply insulation using the staggered joint method for both single and double layer construction, where feasible. Apply each layer of insulation separately.

F. Coat insulated surfaces with layer of insulating cement, troweled in workmanlike manner, leaving a smooth continuous surface. Fill in scored block, seams, chipped edges and depressions, and cover over wire netting and joints with cement of sufficient thickness to remove surface irregularities.

G. Cover fiberglass insulated surfaces with all-service jacketing neatly fitted and firmly secured. Lap seams at least 2". Apply over vapor barrier where applicable.

H. Do not insulate handholes, cleanouts, ASME stamp, and manufacturer's nameplate. Provide neatly beveled edge at interruptions of insulation.

I. Provide removable insulation sections to cover parts of equipment that must be opened periodically for maintenance; include metal vessel covers, fasteners, flanges, frames, and accessories.

END OF SECTION 23 07 00

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Section Includes:

1. Energy Management and Control System (EMCS)
2. Control Valves, Dampers and Actuators
3. Controllers, Sensors, Field Devices
4. General Components
5. Control Wiring and Power Supplies

B. The specification is intended to cover equipment, labor, materials and services sufficient for 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.

1. EMCS manufacturer shall be responsible for all EMCS and temperature control wiring 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.

1.02 REFERENCES

A. References:

1. City, county, state, and federal regulations and codes in effect as of date of purchase.
2. National Fire Protection Association (NFPA) Standards.
3. National Electric Code (NEC) and applicable local Electric Code.
4. Underwriters Laboratories (UL) listing and labels.
5. UL 864 UUKL Smoke Control
6. UL 268 Smoke Detectors.
7. UL 916 Energy Management.
8. NFPA 70 - National Electrical Code.

9. NFPA 90A - Standard For The Installation Of Air Conditioning And Ventilating Systems.

10. NFPA 92A and 92B Smoke Purge/Control Equipment.

11. Factory Mutual (FM).

12. American National Standards Institute (ANSI).

13. National Electric Manufacturer's Association (NEMA).

14. American Society of Mechanical Engineers (ASME).

15. American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) [user note: add ASHRAE 62 IAQ as applicable].

16. Air Movement and Control Association (AMCA).

17. Institute of Electrical and Electronic Engineers (IEEE).

18. American Standard Code for Information Interchange (ASCII).

19. Electronics Industries Association (EIA).

20. Occupational Safety and Health Administration (OSHA).

21. American Society for Testing and Materials (ASTM).

22. Federal Communications Commission (FCC) including Part 15, Radio Frequency Devices.

23. Americans Disability Act (ADA).

24. ANSI/EIA 909.1-A-1999 (LonWorks) 24 ANSI/ASHRAE Standard 195-2004 (BACnet).

B. In the case of conflicts or discrepancies, the more stringent regulation shall apply.

C. All work shall meet the approval of the Authorities Having Jurisdiction at the project site.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Sequencing and Scheduling

1. See Control Diagrams on drawings for required Sequence of Operation.

2. The 96 hour test run shall be made upon completion of the testing, adjusting and balancing for the building. This period is intended to

demonstrate the operation of the complete building. See Part 3 Testing for 96 hour testing requirements.

3. Pre-balance inspection and adjustment of the control systems shall be performed by the control engineer in the presence of the Engineer and commission authority. 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.

4. The temperature controls contractor shall assist the balancing agency as required for proper balancing of the systems with up to ten (10) days of assistance. Furnish a hand-held controller or laptop service tool for the balance agency use during test and balance. This tool shall become the property of the Control Contractor at the end of test and balance.

5. 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 full operational at the time of this demonstration.

B. Coordination with Other Trades, work by Others.

1. It is the responsibility of the EMCS contractor to communicate all specific needs for proper installation (wiring, power, damper and control valves, thermowells, etc.) 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.

2. Coordinate closely with other subcontractors and equipment suppliers to ensure that equipment is provided with features necessary to interface with the EMCS system.

3. 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.

4. 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.

C. Coordination with Packaged Equipment Controls.

1. The EMCS manufacturer shall be responsible for the coordination with all HVAC equipment suppliers and manufacturers to assure compatibility and communication interface requirements between so-call packaged equipment controls (boilers, RTUs, HRUs, heat pumps, VFDs, etc.). In many cases it is possible for the packaged equipment to be provided with self-contained microprocessor based controls that are capable of performing the required sequences of operation required. It shall be the EMCS manufacturer's responsibility prior to bidding to determine whether the packaged equipment will be provided with factory furnished controls or if the EMCS manufacturer will be providing and installing the controls and devices. In all cases it shall be the EMCS manufacturer's responsibility to assure that a complete and fully operational direct digital control based HVAC system is provided.

D. Control Coordination Meeting: Control Contractor(s) shall attend a Controls Coordination Meeting with the Engineer, Owner's HVAC Control Technician after submittal but prior to approval by the engineer. The purpose of this meeting will be to coordinate operational sequences and address Owner's concerns prior to final approval of the submittal.

1.04 SUBMITTALS FOR REVIEW

A. General: Refer to Section 230000 – HVAC General Provisions for submittal format.

B. Product Data: Include manufacturer's technical literature for each control device. Indicate dimensions, capacities, performance characteristics, electrical characteristics, finishes for materials, and installation and startup instructions for each type of product indicated.

1. General Requirements:
   a. Include cover sheet with project name, location, owner information, contractor information, and release date.
   b. Product information sheets will be arrange based on the Bill of materials list.
   c. Provide Product data as single Adobe Acrobat portable document format (PDF) document.
   d. Bill of materials list will contain bookmarks (hyperlinks) to their associated technical sheets for quick access to documents.

2. Complete bill of materials of equipment indicating quantity, manufacturer, and model number for each unique product. This includes but not limited to technical data for operator workstation equipment, interface equipment, control units, transducers/transmitters, sensors, actuators, valves, relays/switches, control panels, and operator interface equipment. When

manufacturer's product datasheets apply to a product series rather than a specific product model, clearly indicate and highlight only applicable information.

3. Control System Software: Include technical data for operating system software, operator interface, color graphics, and other third-party applications.

C. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection. Shop drawings shall be updated to reflect any changes during construction and re-submitted as "As-Built" at end of construction.

1. General Requirements:
   a. Include cover sheet with project name, location, owner information, contractor information, and release date.
   b. Include a drawings index sheet listing each drawing number and title that matches the information in each title block.
   c. Shop drawings shall be 11 inch by 17 inch, landscape.
   d. Provide shop drawings as single Adobe Acrobat portable document format (PDF) document.
   e. Shop drawings shall be arranged based on the following order: Cover Sheet, Index of Drawings, sensor location drawing, control panel location drawing, system architecture diagram, equipment schedules, system control drawings and control transformer drawing. The system control drawings will be arranged by system will include in order by system flow diagram, panel layout drawing, control panel wiring diagram, and I/O wiring details.

2. Floor Plan Wiring and Component Section
   a. Provide floor plans that indicate the location of space sensors and 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. Equipment Location Drawings
   a. Shows location of pressure sensors include reference locations, temperature and humidity sensors, and control panel locations.
   b. Include name of each control panel that is representative of how it will be identified.

4. System Architecture Design Diagram
   a. This is a riser diagram that shall show the IP layer and all of the field bus layers.
   b. It shall show each computer, printer, router, repeater, controller, protocol translator, and end of line resistor locations that are connected to either the IP layer or any of the field busses. Include

approximate fieldbus wire lengths between individual connection points.

c. This diagram shall include the enterprise level system connection.

d. Each component that is shown shall have a name that is representative of how it will be identified in the completed database, the manufacturer's name, model number, mac address and device instance.

e. The physical relationship of one component to another component shall reflect the proposed installation. Example: If AHU1 controller is the closest controller to the Building Controller on the field bus, then this device shall be shown as the first device on the riser diagram just below the Building Controller.

f. This diagram shall not include power supplies, sensors or end devices.

5. Equipment Schedule Drawings

a. Damper Schedule: The damper schedule shall contain a unique identifier corresponding to and in sequence with the existing identification scheme, nominal and actual sizes, orientation of axis and frame, direction of blade rotation, spring ranges, positive positioner ranges, locations of actuators and damper end switches, arrangement of sections in multi-section dampers, and methods of connecting dampers, actuators, and linkages for each damper and actuator furnished. The damper schedule shall include the maximum expected velocity through the damper at the intended location, and the maximum leakage rate at the operating static pressure differential. The damper schedule shall contain actuator selection data supported by calculations of the torque required to move and seal the dampers, and shall show access and clearance requirements.

b. Valve Schedule: The valve schedule shall include a unique identifier corresponding to and in sequence with the existing identification scheme, size, flow coefficient (Cv), pressure drop at specified flow rate, spring range, positive positioner range, and actuator size, supported by close off pressure data, dimensions, and access and clearance requirements data for each valve furnished.

6. A System Flow Design Diagram for each controlled system.

a. A two dimensional cross sectional diagram showing key components such as fans, coils, dampers, valves, pump, etc.

b. Identify the locations and names of all sensors and end devices that are associated with the control system. Label the panel name and terminal numbers where the connections are landed.

c. A legend shall be provided for all symbols used.

d. Bill of materials of equipment indicating quantity, manufacturer, and model number.

e. Written description of sequence of operation.

7. 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). Utilize graphics or reproductions of the actual equipment wiring diagrams for the specific equipment being utilized. Do NOT create generic terminal strip representations that require the field technician to interpret wiring requirements.
    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.

8. Layout Design Drawing for each control panel:
    a. The layout drawing shall be to scale with all devices shown in their proposed positions.
    b. Include name of each control panel and control device that is representative of how it will be identified, the manufacturer's name, model number, mac address and device instance.
    c. All terminal strips and wire channels shall be shown.
    d. Identify control transformer and 120 VAC feeding control panel.

9. Control Panel Wiring Design Diagram for individual components (controllers, protocol translators, etc.): The wiring diagram for each component shall identify all I/O, power, and communication wiring and the locations on the terminal blocks to which the wires are landed. When universal inputs or outputs are used indicate point type (AI, DI, AO, DO) and configuration of any hardware dip switches for point configuration and controller configuration.

10. Installation Design Detail for each I/O device.
    a. A drawing of the wiring details for each sensor and/or end device.
    b. For devices with multiple quantities, a standard detail may be submitted.

11. Graphical User Interface Section
    a. Provide a representation of the typical 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.

12. 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: For BACnet systems 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.

1.05 PROJECT RECORD DOCUMENTS

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. Refer to Section 230000 – HVAC General Provisions.

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. For BACnet system, the points list shall identify BACnet information and address for each point for use in the future by other BACnet manufacturers.

1.06 OPERATION AND MAINTENANCE DATA

A. Refer to Section 230000 – HVAC General Provisions for Operation and Maintenance Data submittal requirements.

B. 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.

5. Maintenance instructions and lists of spare parts for each type of control device and compressed-air station.

6. Keyboard illustrations and step-by-step procedures indexed for each operator function.

7. Inspection period, cleaning methods, cleaning materials recommended, and calibration tolerances.

8. Calibration records and list of set points.

C. Software and Firmware Operational Documentation: Include the following:

1. Software operating and upgrade manuals.

2. Program Software Backup: On a magnetic media or compact disc, complete with data files.

3. Device address list.

4. Printout of software application and graphic screens.

5. Software license required by and installed for DDC workstations and control systems.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Refer to Section 230000 – HVAC General Provisions for additional Delivery, Storage and Handling requirements.

B. Store products in shipping containers in clean, dry location until installation.

C. 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.

1.08 QUALITY ASSURANCE

A. 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 contactor's and Owner's primary contact.

1.09 WARRANTY

A. Standard Material and Labor Warranty:

1. Provide a one-year labor and material warranty on the EMCS.

2. If within twelve (12) months from the date of acceptance of product, upon written notice from the A/E, it is found to be defective in operation, workmanship or materials, it shall be replaced, repaired or adjusted at the option of the EMCS Contractor at the cost of the EMCS Contractor.

3. Maintain an adequate supply of materials within 150 miles of the Project site such that replacement of key parts and labor support, including programming. Warranty work shall be done during EMCS Contractor's normal business hours.

PART 2 - PRODUCTS

2.01 SYSTEMS

A. System Architecture

1. General
   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 an open architecture and fully support a multi-vendor environment. To accomplish this effectively, the EMCS shall not only utilize open communication protocol standards, but also be able to integrate a wide variety of third-party devices and applications via existing vendor protocols and through the latest software standards.
   c. Each equipment controller shall operate independently by performing its own specified control, alarm management, and historical data collection. The failure of any single component or network connection shall not interrupt the execution of control strategies at other operational devices.

2. Automation Network: Ethernet Network Communication: All equipment controllers, the operator's workstation, and other devices not connected downstream of equipment controllers shall communicate over a 10Base-T (or faster) Ethernet Network communications network. Unless specifically indicated on the Electrical Plans, the Automation System shall reside on its own Automation Network and shall not share or otherwise reside on the Building-wide Ethernet Network.

B. Native Bacnet System Requirements

1. 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.

2. The EMCS shall utilize native BACnet architecture as referenced by ANSI/ASHRAE Standard 135-1995.

3. 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.

C. Systems and Equipment Interfaces

1. 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.

2.02 ENERGY MANAGEMENT AND CONTROL SYSTEM (EMCS)

A. Approved Manufacturers/Installer;

1. Siemens Building Technologies using Native BACnet System or, where required and pre-approved by owner, Siemens Proprietary Communications Protocol.

B. Operator's Terminal (Existing)

C. EMCS Software (Existing)

D. Graphical User Interface (Existing)

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.

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)

2.03 DAMPER AND VALVE ACTUATORS

A. Manufacturers:

1. Belimo or Equivalent Siemens product

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.

7. Provide damper actuator size/rating and quantity suitable for control and shut-off dampers sizes being utilized. Coordinate with air handling unit manufacturers to determine size and type of factory furnished dampers.

2.04 DDC CONTROLLERS

A. Manufacturers:

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 ±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 bode 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.
   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.

2.05 COMPONENTS

A. General: Where required components are not listed or specified, but are required for system operation, submit product literature for proposed component based on manufacturer's typical application recommendations.

B. Conduit: Conduit shall meet all requirements of the Latest Edition of the National Electrical Code and State Codes and Division 26.

C. 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

D. Electronic Transmitters: Temperature sensing elements shall be thermistor or platinum RTD type as indicated below.

E. 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.

F. Nameplates: Provide laminated plastic nameplates for all equipment and monitoring and control devices in accordance with the requirements of Section 230553 – Identification for HVAC Piping and Equipment. Each nameplate shall identify the function, such as "mixed air controller" or "cold deck temperature sensor".

G. 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.

H. Power Monitors: Three-phase type with three-phase disconnect/shoring switch assembly; UL listed voltage transformers and UL listed split-core current transformers.

I. 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
   d. Over-ride capability.

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

J. 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. Room Temperature Sensors/Thermostats:
   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. Temperature sensor with LCD display indicating space temperature, humidity, local over-ride, and setpoint adjustment buttons or slider.
      1) Generally sensors in occupied areas (classrooms, offices, conference rooms, etc) have LCD display, adjustable controls within a temperature arrange allowed by the Owner, and over-ride. Coordinate set-up with the Owner.
      2) Sensors in public areas (toilet rooms, corridors, lobbies etc) and mechanical areas (processing room, truck bay, etc.) shall be blank tamperproof style with stainless steel cover plate. Box shall be recessed in the process and truck bay areas to prevent damage from moisture.

4. Humidity Sensors-Indoor
   a. Power: 24 volt input, 4-20 mA output
   b. Humidity Sensor: Impedance type
   c. Accuracy +/-3% RH
   d. Range: 0 to 95% RH
   e. Mounting: Standard 2x4 J-box.
   f. Enclosure: ABS Plastic
   g. Blank Cover
   h. Basis of Design: BAPI Delta Style Room Units

5. Humidity Sensors-Duct
   a. Power: 24 volt input, 4-20 mA output
   b. Humidity Measurement: Humidity Ratio (lbs water/lb air)
   c. Accuracy +/-5% RH
   d. Mounting: Standard 2x4 J-box.
   e. Enclosure: ABS Plastic

6. Outdoor Humidity Sensor
   a. +/- 3% accuracy, 3 point calibration
   b. 0 to 100% RH range
   c. Basis of Design: Veris HO

K. Switches

1. Air Flow Switches:
   a. General purpose utilizing differential air pressure.
   b. SPDT snap-acting contracts.
   c. Adjustable from 0.1 to 2.0 inches WG minimum or as required for the intended application.
   d. Aluminum construction with neoprene diaphragm.

2. Bypass Switches:
   a. Momentary contact type push button.
   b. Installed in standard wall box with stainless steel cover.

3. Current Sensors:
   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.
   f. For on/off indication, digital current transducer with dry contact.
   g. For current measurement, analog current transducer, with 0-10 V or 4-20 ma output scalable to amp draw.

L. Sensor Wells

1. Bronze or brass with NPT threads sized to match associated device.

M. 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.

3. Control Power Transformers:
   a. Provide all low voltage power supplies and transformers in sufficient quantity and distribution, to provide power to all control devices. 24 VAC power supply to all control devices shall be Class II as defined by the NEC.
   b. Transformer size for any load shall be 100 VA maximum, 40 VA minimum. Provide with integral circuit breaker protection.

N. 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.

O. Variable Frequency Drives (VFDs)

1. Variable frequency Drives (VFDs) shall be provided under Section 230926 – Variable Frequency Drives, and factory installed on air handling equipment and/or field installed and wired under Division 26. Coordinate interface and control wiring I/O requirements with EMCS.

P. Wiring: All wiring shall be compliant to local building codes and the NEC and Division 26 of these specifications.

PART 3 - EXECUTION

3.01 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.

3.02 INSTALLATION, 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 power, control signal wiring, network communication wiring/cabling, 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.

F. Provide sufficient slack and flexible connections to allow for piping and equipment vibration isolation.

G. Install equipment in readily accessible locations as defined by National Electrical Code (NEC) Chapter 1 Article 100 Part A.

H. Verify wiring integrity to ensure continuity and freedom from shorts and ground faults.

I. Equipment, installation, and wiring shall comply with industry specifications and standards and local codes for performance, reliability, and compatibility.

J. Test & Balance

1. Provide Test and Balance Contractor a single set of necessary tools to interface to control system for testing and balancing excluding laptop computer.

2. Train Test and Balance Contractor to use control system interface tools.

3. Provide a qualified technician to assist with testing and balancing in getting started with testing.

4. Test and Balance Contractor shall return tools undamaged and in working condition at completion of testing and balancing.

3.03 INSTALLATION

A. 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.

a. Spare Capacity: Provide a minimum of one AI/AO/DI and DO spare point at each controller. Provide a minimum of 25 % spare capacity on each communication trunk for future use.

2. 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.

B. 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.

2. Nameplates: Provide system and component labeling in accordance with the requirements of Section 230553 – Identification for HVAC Piping and Equipment. All control components 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: Mount at 4 feet 0 inches above finished floor unless indicated otherwise. Sensors shall connect to the equipment serving the space the thermostat is located in. Not all thermostats are shown on the drawings and those shown are preliminary locations only. The contractor shall mark all final thermostat locations on-site for approval by the Owner's Representative prior to installation. Locations shall be coordinated with light switches where appropriate.

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 and Outside relative humidity sensors: Install on a north wall with sun shield. Install away for air relief or exhaust vents.

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.

8) Room CO2/Humidity/CO/NO2 Sensors: Install on concealed junction boxes properly supported by the wall construction.

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. Differential Air Static Pressure.
   a. Supply Duct Static Pressure. Pipe high-pressure tap to duct using a pitot tube. Make pressure tap connections according to manufacturer's recommendations.
   b. Return Duct Static Pressure. Pipe high-pressure tap to duct using a pitot tube. Make pressure tap connections according to manufacturer's recommendations.
   c. Building Static Pressure. Pipe pressure sensor's low-pressure port to the static pressure port located on the outside of the building through a high-volume accumulator. Pipe high-pressure port to a location behind a thermostat cover.
   d. Piping to pressure transducer pressure ports shall contain a capped test port adjacent to transducer.
   e. Pressure transducers, except those controlling VAV boxes, shall be located in control panels, not on monitored equipment or on ductwork. Mount transducers in a vibration-free location accessible for service without use of ladders or special equipment.
   f. Mount gauge tees adjacent to air and water differential pressure taps. Install shut-off valves before tee for water gauges.

8. CO/CO2/NO2/Humidity Sensors
   a. Mount duct mounted sensors per manufacturer’s instructions. Locate in accessible locations for maintenance or recalibration.
   b. Mount wall mounted sensors where indicated on plans or adjacent to room temperature sensors.

9. Wiring
   a. Provide all power, control and network wiring and raceways for a complete and fully operational system under this Section, including line voltage power supply to controller and transformers, low voltage power supplies to field devices, actuators, switches, sensors and controllers, and hard-wired I/O wiring and all network communications wiring and/or cabling. Coordinate with Division 26 for available power supply sources.
   b. Control and interlock wiring and installation shall comply with national and local electrical codes, Division 26, and manufacturer's recommendations.
   c. NEC Class 1 (line voltage) wiring shall be UL listed in approved raceway as specified by NEC and Division 26.
   d. Low-voltage wiring shall meet NEC Class 2 requirements. Sub-fuse low-voltage power circuits as required to meet Class 2 current limits.
   e. NEC Class 2 wires not run in raceways, but run in concealed and accessible locations, such as return air plenums, shall be UL listed for intended applications.
   f. Wiring inside control cabinets shall be dressed neatly and tied with Thomas and Betts wire ties. Plastic tooth wire ties are not acceptable.
   g. 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.
   h. Wiring routed from equipment shall be in a manner as to avoid injury to the wiring.
   i. "Across-the hinge" wiring shall be dressed to avoid strain and abrasion. Provide spiral wrap suitable to this application.
   j. Install instrumentation grounding as necessary to preclude ground loops and noise from adversely affecting equipment operations.
   k. Wiring shall be enclosed in conduit in the following conditions:
      1) All wiring in mechanical/equipment rooms, below 7 foot level, in catwalk platform areas, electrical or service rooms, or other areas subject to damage.
      2) Concealed wiring in walls or above hard-lid ceilings.
      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.

l. 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.

10. 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.

11. Warning Labels
   a. Affix permanent warning labels to equipment that can be automatically started by the control system.
      1) Labels shall use white lettering (12-point type or larger) on a red background.
      2) Warning labels shall read as follows:

C A U T I O N
This equipment is operating under automatic control and may start or stop at any time without warning. Switch disconnect to "Off" position before servicing.

   b. Affix permanent warning labels to motor starters and control panels that are connected to multiple power sources utilizing separate disconnects.
      1) Labels shall use white lettering (12-point type or larger) on a red background.

Warning labels shall read as follows: C A U T I O N
This equipment is fed from more than one power source with separate

disconnects. Disconnect all power sources before servicing.

12. Identification of Hardware and Wiring
    a. Label wiring and cabling, including that within factory-fabricated panels, with control system address or termination number at each end within 2 in. of termination.
    b. Label pneumatic tubing at each end within 2 in. of termination with a descriptive identifier.
    c. Permanently label or code each point of field terminal strips to show instrument or item served.
    d. Label control panels with minimum ½ in. letters on laminated plastic nameplates.
    e. Label each control component with a permanent label. Label plug-in components such that label remains stationary during component replacement.
    f. Label room sensors related to terminal boxes or valves with nameplates.
    g. Manufacturers' nameplates and UL or CSA labels shall be visible and legible after equipment is installed.
    h. Label identifiers shall match record documents.

3.04 PROGRAMMING

A. Point Naming. Name points as shown on the equipment points list provided with each sequence of operation. If character limitations or space restrictions make it advisable to shorten the name. Where multiple points with the same name reside in the same controller, each point name may be customized with its associated Program Object number. For example, "Zone Temp 1" for Zone 1, "Zone Temp 2" for Zone 2.

B. Software Programming. Programming shall provide actions for each possible situation. Graphic- or parameter-based programs shall be documented. Text-based programs shall be modular, structured, and commented to clearly describe each section of the program.

1. Application Programming. Provide application programming that adheres to sequences of operation specified. Program documentation or comment statements shall reflect language used in sequences of operation.

2. System Programming. Provide system programming necessary for system operation.

C. Operator Interface

1. Standard Graphics. Provide graphics as specified. Show on each equipment graphic input and output points and relevant calculated points such as indicated on the applicable Points List as indicated on the drawings. Point information on graphics shall dynamically update.

2. Install, initialize, start up, and troubleshoot operator interface software and functions (including operating system software, operator interface database, and third-party software installation and integration required for successful operator interface operation) as described in Section 23 09 00.

D. Alarm Processing

1. Coordinate with the owner for a list of alarm priorities required for the building. A minimum of 15 separate priorities shall be configured.

2. Alarms required by the sequence of control shall be fully configured for delivery to the operator workstations and the alarm files.

3. A common alarm file shall be established to receive alarms from the field devices.

4. A separate alarm file shall be established on a per building basis to receive just the alarms from that building.

5. The alarm messages shall be descriptive and include as a minimum:
   a. Building identification.
   b. System identification.
   c. Date.
   d. Time to the second.
   e. Nature of the alarm such as high value, low value, or fail to start.

6. The system shall be configured to send an alarm message on return to normal.

7. Additional alarms that are required to be added to building systems include fans, pumps, chillers, etc. used for preventative maintenance.
   a. Run time alarm for preventative maintenance.
   b. Performance deviation reports that compare actual performance with specified performance. An example would be the average deviation from set point for space temperatures, discharge air temperatures on air handling units, etc.

E. Trends

1. Trend I/O point present values, set points, and other parameters used in the sequence of operation.

2. Trends shall be stored within the controller and uploaded to server automatically on reaching 80% of controller buffer limit, or by operator request, or by archiving time schedule.

3. Standard trend intervals for each I/O point are as follows:
   a. Temperature noncritical – 5 min
   b. Temperature Critical – COV of 0.25°
   c. Manual Setpoints – COV
   d. Auto Resetting Setpoints – COV 0.5°

e. Zone Humidity noncritical – 5 min
f. Zone Humidity Critical – COV of 3%
g. Static Pressure – 1 Min
h. Damper position – COV 5%
i. Fan status – COV
j. Fan Command - COV
k. Fan speed – COV 5%
l. Valve command – COV 5%
m. Valve command – COV 5%
n. Damper position – COV 5%
o. Occupancy mode - COV
p. Water temperature – 5 Min
q. Water set point - COV
r. Equipment load – 5 Min
s. Pump status – COV
t. Pump Command - COV
u. Water gpm – COV 5% of Max Flow
v. Differential pressure – 5 Min
w. Electrical Consumption – 15 Min

4. Minimum number of consecutive trend values stored at one time shall be 100 per variable.

5. Archived and real-time trend data shall be available for viewing numerically and graphically.

3.05 INTEGRATION TO OTHER SYSTEMS AND EQUIPMENT WITH INTEGRAL CONTROLS

A. Communication Interface:

1. EMCS shall have a communication interface with equipment having integral controls and having a communication interface for remote monitoring or control.

B. Points to be mapped:

1. Coordinate with owner as to which points shall be required to be mapped from communication interface to Network graphical interface. Allow for a minimum of 20 points for each piece of equipment, unless noted otherwise.

3.06 START-UP

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.

3.07 CALIBRATION AND ADJUSTING

A. Calibrate all sensors and devices.

B. Submit calibration sheets to the Owner's Representative.

C. Make 3 point calibration test for both linearity and accuracy for each analog device.

D. Calibrate devices according to manufacturer's directions.

E. Adjust flow, pressure and temperature switches.

F. Stroke and adjust control valves and dampers.

G. Adjust all initial temperature setpoints.

3.08 TESTING

A. The completed control system shall be adjusted and tested under operating conditions by a qualified technician in the employ of the EMCS Contractor.

B. Startup Testing Plan: Submit a startup testing plan for each unique system.

1. The purpose of a startup test is to demonstrate the "completeness" of the physical tasks associated with installation and the physical performance of the components.

2. For each task on the startup test checklist, the plan shall require the technician to enter his or her initials and the date the test was completed along with any recorded data such as voltages, offsets, or tuning parameters. Any deviations from the submitted installation plan shall also be recorded.

3. Required elements of the startup testing include:
   a. Measurement of voltage sources, primary and secondary.
   b. Verification of proper controller power wiring.
   c. Verification of component inventory when compared to the submittals.
   d. Verification of labeling on components and wiring.

e. Verification of connection integrity and quality (loose strands and tight connections).
f. Verification of bus topology, grounding of shields and installation of termination devices.
g. Verification of point checkout.
   1) Each I/O device is landed per the submittals and functions per the sequence of control.
   2) Analog sensors are properly scaled and a value is reported
   3) Binary sensors have the correct normal position and the state is correctly reported.
   4) Analog outputs have the correct normal position and move full stroke when so commanded.
   5) Binary outputs have the correct normal state and respond appropriately to energize/de-energize commands.
h. Documentation of analog sensor calibration (measured value, reported value and calculated offset).
i. Documentation of Loop tuning (sample rate, gain and integral time constant).

4. Submit at least four weeks prior to any scheduled start-up tests.

5. Submit completed Startup Testing Report.
   a. Startup testing reports shall be submitted on a per system basis.
   b. Startup testing reports shall be the documented results of the executed startup testing plans.

C. 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.

3.09 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.

3.10 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.

3.11 CLOSEOUT ACTIVITIES

A. Refer to Section 230000 – HVAC General Provisions

B. System Demonstration

1. 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.

2. 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.

3. The complete and fully operational control system shall be 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.

4. Demonstration of the system shall occur in order to verify overall compliance with the above start-up and testing.

5. Demonstration shall be prior to, and in addition to, the required operator training.

C. Owner Training

1. Training shall be conducted by an engineer familiar with the specific design of the system provided for this project.

2. Training sessions shall include all necessary people including the controls system programmer, the controls components installer, and other representatives as necessary to access equipment and components and for clarification of interfaces with other systems.
   a. Systems Interface (Provide the following for each individual system):

1) Provide a presentation of how the sequence of operation has been implemented.
2) Show the location in the graphics of each viewable input and output.
3) Show the location in the graphics of each adjustable setpoint, including the procedure for adjustment.
4) Show the graphic presentation of each system alarm.

b. Components:
1) Show the actual location for each sensor, control system device and control panel.
2) Show procedure for any required maintenance of components, as well as replacement procedures as appropriate.

c. Review of each system and the sequence of operations.

3.12 MAINTENANCE SERVICES

A. Complete service as required, including, but not limited to, a minimum of four (4) service inspections of all control systems during the first year following acceptance of the work. The inspections shall be scheduled as close as possible to the beginning of the heating and cooling seasons with the final inspection just prior to the expiration of the warranty period. These inspections are in addition to any warranty calls that are required during the warranty period Documentation shall be forwarded to the Owner's Representative with a copy to the Design Engineer at the completion of each trip.

3.13 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.

B. The 96 hour rest run shall be made upon completion of the resting, adjusting and balancing.

C. 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. Notify Owner's Representative prior to beginning the 96-hour run test.

END OF SECTION 23 09 00

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes basic requirements for variable frequency drives.

B. Related Sections: 23 05 13 “Motors”.

1.02 QUALITY ASSURANCE

A. The variable frequency drives and all components shall be designed, manufactured and tested in accordance with the latest applicable standards of IEC, UL, CUL, and NEMA.

B. The supplier of the assembly shall be the manufacturer of the electromechanical power components used within the assembly, such as bypass contactors when specified.

C. For the equipment specified herein, the manufacturer shall be ISO 9001certified.

D. Variable Frequency Drives shall be on the basis of ABB ACH 550 Series for function and quality. Products that are in compliance with the specification and manufactured by others will be considered as “Approved Equal” only if pre-approved by the Engineer fourteen (14) days prior to bid date. Alternate suppliers shall submit documentation showing itemized compliance to the specifications and experience specific to the proposed VFD including a list showing details of the installation, application, location, contact name and telephone number of at least 10 users.

1.03 SUBMITTALS

A. Product Data: Include manufacturer’s descriptive literature, operating instructions, installation instructions, maintenance and repair data, and parts listings.

B. Shop Drawings:

1. Dimensioned outline drawing.

2. Schematic diagram.

3. Power and control connection diagram(s).

4. Purchase Order or Bill of Sale to allow Owner to submit to Utility Co. for Rebates.

C. Operation and Maintenance Data:

1. Submit operation and maintenance data per the requirements of Section 23 00 00.

2. Include manufacturer's descriptive literature, operating instructions, installation instructions, maintenance and repair data, and parts listings.

D. Warranty

1.04 DELIVERY, STORAGE AND HANDLING

A. Equipment shall be handled and stored in accordance with manufacturer's instructions. One (1) copy of these instructions shall be included with the equipment at time of shipment.

1.05 WARRANTY

A. Provide two years (24 months) warranty under the provisions of Section 23 00 00. The warranty shall include parts, labor, travel costs and living expenses incurred by the manufacturer to provide factory authorized service.

PART 2 - PRODUCTS

2.01 MANUFACTURES

A. ABB

B. Prior Approved Equal.

2.02 ADJUSTABLE FREQUENCY DRIVES

A. Where indicated in the drawings and specifications, variable frequency drives shall have the following features:

1. The VFDs shall be rated for 480 Vac and sized for motor HP with a service factor of 20%. The VFD shall provide microprocessor based control for three-phase induction motors. The controller's full load output current rating shall be based on variable torque application at 40° C ambient and 10 kHz switching frequency below 40 Hp and 3.6 kHz 40 Hp and above to reduce motor noise and avoid increased motor losses.

2. The VFDs shall be of the Pulse Width Modulated (PWM) design converting the utility input voltage and frequency to a variable voltage and frequency output via a two-step operation. Variable Current Source VFDs are not acceptable. Insulated Gate Bipolar Transistors (IGBTs) shall be

used in the inverter section. Bipolar Junction Transistors, GTOs or SCRs are not acceptable. The VFDs shall run at the above listed switching frequencies.

3. The VFDs shall have an efficiency at full load and speed that exceeds 95% for VFDs below 15 Hp and 97% for drives 15 Hp and above. The efficiency shall exceed 90% at 50% speed and load.

4. The VFDs shall maintain the line side displacement power factor at no less than 0.96, regardless of speed and load.

5. The VFDs shall have a one (1) minute overload current rating of 110% for variable torque applications.

6. The VFDs shall be capable of operating any NEMA design B squirrel cage induction motor, regardless of manufacturer, with a horsepower and current rating within the capacity of the VFD.

7. The VFDs shall limit harmonic distortion reflected onto the utility system to a voltage and current level as defined by IEEE 519 for general systems applications, by utilizing the standard 3% nominal impedance integral ac three-phase line reactor.

8. Any harmonic calculations shall be done based on the kVA capacity, X/R ratio and the impedance of the utility transformer feeding the installation, as noted on the drawings, and the total system load. The calculations shall be made with the point of common coupling being the point where the utility feeds multiple customers.

9. Total harmonic distortion shall be calculated under worst case conditions in accordance with the procedure outlined in IEEE standard 519-1992. Copies of these calculations are to be made available upon request. The contractor shall provide any needed information to the VFD supplier three (3) weeks prior to requiring harmonic calculations.

10. The system containing the VFDs shall comply with the 5% level of total harmonic distortion of line voltage and the line current limits as defined in IEEE 519-1992. If the system cannot meet the harmonic levels with the VFDs provided with the standard input line reactor or optional input isolation transformer, the VFD manufacturer shall supply an eighteen pulse, multiple bridge rectifier ac to dc conversion section with phase shifting transformer for all drives above 75 Hp. This eighteen pulse rectifier converter shall result in a multiple pulse current waveform that will more nearly approximate a true sinewave to reduce voltage harmonic content on the utility line. The phase shifting transformer shall be of a single winding type to optimize its KVA rating and harmonic cancellation capability.

11. Harmonic filters are not acceptable above 75 Hp.

12. The VFDs shall be able to start into a spinning motor. The VFDs shall be able to determine the motor speed in any direction and resume operation without tripping. If the motor is spinning in the reverse direction, the VFDs shall start into the motor in the reverse direction, bring the motor to a controlled stop, and then accelerate the motor to the preset speed.

13. Standard operating conditions shall be:
    a. Incoming Power: Three-phase, 480 Vac (+10% to -15%) and 50/60 Hz (+/-5 Hz) power to a fixed potential DC bus level.
    b. Frequency stability of +/-0.05% for 24 hours with voltage regulation of +/-1% of maximum rated output voltage.
    c. Speed regulation of +/- 0.5% of base speed.
    d. Load inertia dependant carryover (ridethrough) during utility loss.
    e. Insensitive to input line rotation.
    f. Humidity: 0 to 95% (non-condensing and non-corrosive).
    g. Altitude: 0 to 3,300 feet (1000 meters) above sea level.
    h. Ambient Temperature: -10 to 40 °C (VT).
    i. Storage Temperature: -40 to 60 °C.

14. Control Functions:
    a. Frequently accessed VFD programmable parameters shall be adjustable from a digital operator keypad located on the front of the VFD. The VFDs shall have a 3 line alphanumeric programmable display with status indicators. Keypads must use plain English words for parameters, status, and diagnostic messages. Keypads that are difficult to read or understand are not acceptable, and particularly those that use alphanumeric code and tables. Keypads shall be variable for contrast with large characters easily visible in normal ambient light.
    b. Standard advanced programming and trouble-shooting functions shall be available by using a personal computer's RS-232 port and Windows™ based software. In addition the software shall permit control and monitoring via the VFD's RS232 port. The manufacturer shall supply a diskette with the required software. An easily understood instruction manual and software help screens shall also be provided. The computer software shall be used for modifying the drive setup and reviewing diagnostic and trend information as outlined in this section through section 18.
    c. The operator shall be able to scroll through the keypad menu to choose between the following:
        1) Monitor
        2) Operate
        3) Parameter setup
        4) Actual parameter values
        5) Active faults
        6) Fault history
        7) LCD contrast adjustment
        8) Information to indicate the standard software and optional features software loaded.
    d. The following setups and adjustments, at a minimum, are to be available:

1) Start command from keypad, remote or communications port
2) Speed command from keypad, remote or communications port
3) Motor direction selection
4) Maximum and minimum speed limits
5) Acceleration and deceleration times, two settable ranges
6) Critical (skip) frequency avoidance
7) Torque limit
8) Multiple attempt restart function
9) Multiple preset speeds adjustment
10) Catch a spinning motor start or normal start selection
11) Programmable analog output
12) Proportional/Integral process controller

e. The VFDs shall have the following system interfaces:
1) Inputs – A minimum of six (6) programmable digital inputs, two (2) analog inputs and serial communications interface shall be provided with the following available as a minimum:
a) Remote manual/auto
b) Remote start/stop
c) Remote forward/reverse
d) Remote preset speeds
e) Remote external trip
f) Remote fault reset
g) Process control speed reference interface, 4-20mAdc
h) Potentiometer or process control speed reference interface, 1-10Vdc
i) RS232 programming and operation interface port
2) Outputs – A minimum of two (2) discrete programmable digital outputs, one (1) programmable open collector output, and one (1) programmable analog output shall be provided, with the following available at minimum.
3) Programmable relay outputs with one (1) set of Form C contacts for each, selectable with the following available at minimum:
a) Fault
b) Run
c) Ready
d) Reversing
e) Jogging
f) At speed
g) In torque limit
h) Motor rotation direction opposite of commanded
i) Overtemperature
4) Programmable open collector output with available 24Vdc power supply and selectable with the following available at minimum:
a) Fault
b) Run

c) Ready
d) Reversing
e) Jogging
f) At speed
g) In torque limit
h) Motor rotation direction opposite of commanded
i) Overtemperature

5) Programmable analog output signal, selectable with the following available at minimum:
a) Output current
b) Output frequency
c) Motor speed
d) Motor torque
e) Motor power
f) Motor voltage
g) DC link voltage
h) Monitoring and Displays

6) The VFD's display shall be a LCD type capable of displaying three (3) lines of text and the following thirteen (13) status indicators:
a) Run
b) Forward
c) Reverse
d) Stop
e) Ready
f) Alarm
g) Fault
h) Local
i) Panel
j) Remote
k) Hand
l) Auto
m) Off

7) The VFD's keypad shall be capable of displaying the following monitoring functions at a minimum:
a) Output frequency
b) Output speed
c) Motor current
d) Motor torque
e) Motor power
f) Motor voltage
g) DC-link voltage
h) Heatsink temperature
i) Total operating days counter
j) Operating hours (resetable)
k) Total megawatt hours
l) Megawatt hours (resetable)
m) Voltage level of analog input
n) Current level of analog input
o) Digital inputs status
p) Digital and relay outputs status

q) Motor temperature rise, percentage of allowable.

15. Protective Functions:
    a. The VFD shall include the following protective features at minimum:
        1) Overcurrent/Overvoltage
        2) Inverter fault
        3) Undervoltage
        4) Phase loss
        5) Output phase loss
        6) Undertemperature
        7) Overtemperature
        8) Motor stalled
        9) Motor overtemperature
        10) Motor under load Logic voltage failure
        11) Microprocessor failure
        12) DC injection braking

16. The VFD shall provide ground fault protection during power-up, starting, and running. VFD's with no ground fault protection during running are not acceptable.

17. Diagnostic Features
    a. Fault History.
    b. Record and log faults
    c. Indicate the most recent first, and store up to 9 faults.

18. Optional features to be included in the VFD:
    a. HMCP or thermal magnetic breaker to provide a disconnect means. Operating handle shall protrude the door. The disconnect shall not be mounted on the door. The handle position shall indicate ON, OFF, and TRIPPED condition. The handle shall have provisions for padlocking in the OFF position with at least three (3) padlocks. Interlocks shall prevent unauthorized opening or closing of the VFD door with the disconnect handle in the ON position. This shall be defeatable by maintenance personnel.
    b. Three contactor bypass shall include a drive input disconnect, an VFD input isolation contactor, bypass contactor and an VFD output contactor that is electrically and mechanically interlocked with the bypass contactor. This circuit shall include control logic, status lights and motor overcurrent relays. The complete bypass system (Hand-Off-Auto with Inverter-Bypass) selector switch(s), and inverter/bypass pilot lights shall be packaged with the VFD. The unit may be set up for Manual bypass operation upon an VFD trip.
    c. Communication card for interface with ANSI/ASHRAE standard 135 (including all current addenda) bacnet using MST protocol(Modbus RTU) (Johnson Controls Metasys N2) (Siemens Building Technologies Apogee FLN) (Lonworks) control system.

19. Enclosure

a. The VFD enclosure shall be NEMA 1. The VFD shall have complete front accessibility with easily removable assemblies.
b. The VFD manufacturer shall maintain, as part of a national network, engineering service facilities within 250 miles of project to provide start-up service, emergency service calls, repair work, service contracts, maintenance and training of customer personnel.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Variable frequency drives shall be provided by the Division 23 contractor. VFD shall be field mounted by Division 26 or by the AHU manufacturer as noted below. Power wiring & connections from the electrical service to the VFD and from the VFD to the pumps/fans shall be field provided by division 26. Control wiring & connections between DDC controller and VFD shall be field provided by section 230900 contractor.

B. The following standard factory tests shall be performed on the equipment provided under this section. All tests shall be in accordance with the latest version of UL and NEMA standards:

1. All printed circuit boards shall be functionally tested via automatic test equipment prior to unit installation.

2. All final assemblies shall be tested at full load with application of line-to-line and line-to-ground bolted faults. The Variable Frequency Drive shall trip electronically without device failure.

3. After all tests have been performed, each VFD shall undergo a burn-in test. The drive shall be burned in at 100% inductive or motor load without an unscheduled shutdown.

4. After the burn-in cycle is complete, each VFD shall be put through a motor load test before inspection and shipping.

5. The manufacturer shall provide three (3) certified copies of factory test reports.

3.02 FIELD QUALITY CONTROL

A. Provide the services of a qualified manufacturer's employed Field Service Engineer or authorized service representative to assist the Contractor in installation and start-up of the equipment specified under this section. Field Service personnel shall be factory trained with periodic updates and have experience with the same model of VFD’s on the job site. Sales representatives will not be acceptable to perform this work. The manufacturer's service

representative shall provide technical direction and assistance to the Contractor in general assembly of the equipment, installation as specified in manufacturer's installation instructions, wiring, application dependant adjustments, and verification of proper VFD operation.

B. The following minimum work shall be performed by the Contractor under the technical direction of the manufacturer's service representative.

C. Inspection and final adjustments.

D. Operational and functional checks of VFDs and spare parts.

E. The contractor shall certify that he has read the drive manufacturer's installation instructions and has installed the VFD in accordance with those instructions.

F. The Contractor shall provide three (3) copies of the manufacturer's field start-up report before final payment is made

END OF SECTION 23 09 26

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes pipe and fitting materials and joining methods for hydronic heating and/or cooling water systems.

B. Related Sections include the following:

1. Division 23 Section "Hydronic Pumps" for pumps, motors, and accessories for hydronic piping.
2. Division 23 Section “General Duty Valves for HVAC Piping.” for hydronic valves.

    a. Valves and Pipe line specialties available from Grooved-end or pressure seal manufacturers are not allowed as substitutions for specified valves.

3. Division 23 Section “Hydronic Piping Specialties” for air control devices, special duty valves, and other hydronic specialties.

    a. Valves and Pipe line specialties available from Grooved-end or pressure seal manufacturers are not allowed as substitutions for specified valves.

4. Division 23 Section “Pipe Expansion Fittings and Loops” for flexible pipe connectors and expansion fittings.
5. Division 23 Section “HVAC Water Treatment” for accessories related to chemical water treatment and controls.

1.2 PERFORMANCE REQUIREMENTS

A. Hydronic piping components and installation shall be capable of withstanding the following minimum working pressure and temperature of 125 psig at 200 deg F.

B. Reference Standards:

1. American Society of Mechanical Engineers (ASME):

    a. ASME Boiler and Pressure Vessel Code: Section IX, Welding and Brazing Qualifications.
    b. ASME B1.20 – Pipe Threads, General Purpose, Inch.
    c. ASME B16.21 - Nonmetallic Flat Gaskets for Pipe Flanges.
    d. ASME B31 Series, Code for Pressure Piping.

2. ASTM International:

    a. ASTM A53 – Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
    b. ASTM B32 – Standard Specification for Solder Metal

c. ASTM B813 – Standard Specification for Liquid and Paste Fluxes for Soldering of Copper and Copper Alloy Tube.
d. ASTM B828 – Standard Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings.
e. ASTM D1785 – Standard Specification for Poly Vinyl Chloride (PVC) Plastic Pipe, Schedules 40, 80, and 120.
f. ASTM D2564 – Standard Specification for Solvent Cements for Poly Vinyl Chloride (PVC) Plastic Piping Systems.
g. ASTM F493 – Standard Specification for Solvent Cements for Chlorinated Poly Vinyl Chloride (CPVC) Plastic Pipe and Fittings.
h. ASTM F656 – Standard Specification for Primers for Use in Solvent Cement Joints of Poly Vinyl Chloride (PVC) Plastic Pipe and Fittings.

3. American Welding Society (AWS):

a. AWS A5.8 – Specification for Filler Metals for Brazing and Braze Welding.
b. AWS D1.1 – Structural Welding Code – Steel.
c. AWS D10.12 - Guide for Welding Mild Steel Pipe.

4. Copper Development Association (CDA):

a. Copper Tube Handbook.

1.3 SUBMITTALS

A. Product Data: For each type of the following:

1. Copper and Steel Pipe and Fittings.
2. Pressure-seal fittings (if used).
3. Grooved-end Copper and Steel Pipe and Fittings (if used).

B. Welding Certificates.

C. Field quality-control test reports.

D. Qualification Data: Installer certificates for grooved or pressure sealed piping.

1.4 QUALITY ASSURANCE

A. ASME Compliance: Comply with ASME B31.9, "Building Services Piping," for materials, products, and installation. Safety valves and pressure vessels shall bear the appropriate ASME label. Fabricate and stamp air separators and expansion tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.

B. Installer Qualifications:

1. Steel Pipe Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, “Welding and Brazing Qualifications.”

a. Comply with provisions in ASME B31 Series, “Code for Pressure Piping.”
b. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.

PART 2 - PRODUCTS

2.1 STEEL PIPE AND FITTINGS

A. Steel Pipe: ASTM A 53, black steel, Type E or S, Grade B, with plain ends and wall thickness as indicated in Part 3 "Piping Applications" Article.

B. Cast-Iron Threaded Fittings: ASME B16.4; Classes 125 and 250 as indicated in Part 3 "Piping Applications" Article.

C. Malleable-Iron Threaded Fittings: ASME B16.3, Classes 150 and 300 as indicated in Part 3 "Piping Applications" Article.

D. Malleable-Iron Unions: ASME B16.39; Classes 150, 250, and 300 as indicated in Part 3 "Piping Applications" Article.

E. Cast-Iron Pipe Flanges and Flanged Fittings: ASME B16.1, Classes 25, 125, and 250; flat face, and bolt holes as indicated in Part 3 "Piping Applications" Article..

F. Wrought-Steel Fittings: ASTM A 234/A 234M, wall thickness to match adjoining pipe.

G. Wrought Cast- and Forged-Steel Flanges and Flanged Fittings: ASME B16.5 and A-105 including bolts, nuts, and gaskets of the following end connections, and facings:

1. End Connections: Socket weld or weld-neck.
2. Facings: Raised face or flat face, to suite application (temperature and pressure) and/or equipment connection facing (do not mix facing types).

2.2 JOINING MATERIALS

A. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

B. Pipe-Flange Gasket Materials: ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch maximum thickness unless otherwise indicated. Gasket materials shall be suitable for pressure, temperature and fluids being used. Garlock Stress Saver or Blue-Gard series or equal. Do NOT use Red Rubber Gaskets.

1. Full-face Type Gasket: For flat-face, Class 125 cast iron, cast-bronze or PVC flanges
2. Narrow-face (Ring) Type Gasket: For raised-face, Class 150 and above, steel flanges.

C. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.

D. Welding Filler Metals: Comply with AWS D10.12.

E. Welding Materials: Comply with Section II, Part C, of ASME Boiler and Pressure Vessel Code for welding materials appropriate for wall thickness and for chemical analysis of pipe being welded.

F. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.

2.3 DIELECTRIC FITTINGS

A. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Capitol Manufacturing Company.
2. Central Plastics Company.
3. Hart Industries International, Inc.
4. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
5. Zurn Plumbing Products Group; AquaSpec Commercial Products Division

B. Description: Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.

C. Insulating Material: Suitable for system fluid, pressure, and temperature.

D. Dielectric Unions: Factory-fabricated, union assembly, for 250-psig minimum working pressure at 180 deg F.

E. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150 or 300-psig minimum working pressure as required to suit system pressures.

F. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300-psig minimum working pressure at 225 deg F.

G. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig minimum working pressure at 225 deg F.

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS

A. Hydronic piping, aboveground, NPS 2” and smaller, shall be one of the following:

1. Type L, drawn-temper copper tubing, wrought-copper fittings, and soldered joints.
2. Schedule 40 steel pipe; Class 150, malleable-iron fittings; cast-iron flanges and flange fittings; and threaded joints.

3. Type L, drawn-temper copper tubing, with wrought copper or brass pressure seal fitting.

B. Hydronic piping, aboveground, NPS 2-1/2" and larger, shall be one of the following:

1. Type L, drawn-temper copper tubing, wrought-copper fittings, and brazed joints.
2. Schedule 40 steel pipe, wrought-steel fittings and wrought-cast or forged-steel flanges and flange fittings, and welded and flanged joints.
3. Type L, drawn-temper copper tubing, with wrought copper or brass pressure seal fittings.
4. Type L, drawn-temper copper tubing with grooved-end mechanical copper fittings and couplings.
5. Schedule 40 steel pipe with grooved-end mechanical ductile or malleable iron fittings and couplings.

3.2 PIPING INSTALLATIONS

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicate piping locations and arrangements if such were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

B. Install piping in concealed locations, unless otherwise indicated except in equipment rooms and service areas. Pipe routed inside exterior walls shall be installed on the warm side of the insulation.

C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

E. Install piping to permit valve servicing.

F. Install piping at indicated slopes.

G. Install piping free of sags and bends.

H. Install fittings for changes in direction and branch connections.

I. Install piping to allow application of insulation.

J. Select system components with pressure rating equal to or greater than system operating pressure.

K. Install groups of pipes parallel to each other, spaced to permit applying insulation and servicing of valves.

L. Install drains, consisting of a tee fitting, NPS 3/4 ball valve, and short NPS 3/4 threaded nipple with cap, at low points in piping system mains and elsewhere as required for system drainage.

M. Reduce pipe sizes where required using eccentric reducer fitting installed with level side up. Reducers are not indicated on drawings.

N. Install unions in piping, NPS 2 and smaller, at final connections of equipment, and elsewhere as indicated.

O. Install flanges in piping, NPS 2-1/2 and larger, at connections to equipment, pumps, valves and elsewhere as indicated. Do not use flanges to join runs of piping together or at elbows, tees, etc., in order to avoid field welding or brazing (i.e. pre-fabricated piping shall not be joined with flanges).

P. Identify piping as specified in Division 23 Section "Mechanical Identification."

Q. Dielectric Fitting: Provide dielectric fitting where copper piping is connected to steel piping.

R. Install branch connections to mains using tee fittings in main pipe, with the branch connected to the top of the main pipe.

S. Coordinate installation of temperature and pressure sensor wells with Division 23 Section “Instrumentation and Controls for HVAC.”

T. Install escutcheons at exposed penetrations of walls, ceilings and floors.

3.3 HANGERS AND SUPPORTS

A. Hanger, support, and anchor devices are specified in Division 23 Section "Hangers and Supports."

3.4 PIPE JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

C. Threaded Joints: Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

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

E. Flanged Joints: Utilize flat-face or raised-face flanges as appropriate for service pressure and temperature. Do not mix face types. Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

3.5 EQUIPMENT AND TERMINAL UNIT CONNECTIONS

A. Sizes for supply and return piping connections to equipment, coils, etc. shall equal to the full branch run-out sizes indicated on the drawings. Provide reducers at equipment connections and before and after control valves, balance valves, etc. when necessary. All near-coil/equipment piping shall be full branch line size, including bypass lines, etc. and shall only be reduced for smaller diameter control valves or coil/equipment connections.

B. Where air handling units are provided with multiple (stacked) coil banks, provide divided branch supply and return piping connections to each coil in the bank, whether or not indicated on the drawings or piping details. Branch piping to each coil in the bank may be reduced from the main indicated pipe size, but not to be smaller than the coil connection sizes.

C. Install unions, in piping 2” and smaller, at final connections to each piece of equipment, on each side of control valves and elsewhere as indicated.

D. Install Flanges, in piping 2 ½” and larger, at first connections to equipment and at all flanged valves and devices.

E. Install isolation valves, control valves, balance valves, strainers, etc. in accessible locations close to connected equipment. Do not block service access to equipment.

F. Provide flexible connectors or hoses when indicated or as specified elsewhere.

3.6 FIELD QUALITY CONTROL

A. Prepare hydronic piping according to ASME B31.9 and as follows:

1. Leave joints, including welds, uninsulated and exposed for examination during test.
2. Provide temporary restraints for expansion joints that cannot sustain reactions due to test pressure. If temporary restraints are impractical, isolate expansion joints from testing.
3. Flush hydronic piping systems with clean water; then remove and clean or replace strainer screens.
4. Isolate equipment from piping. If a valve is used to isolate equipment, its closure shall be capable of sealing against test pressure without damage to valve. Install blinds in flanged joints to isolate equipment.

5. Install safety valve, set at a pressure no more than one-third higher than test pressure, to protect against damage by expanding liquid or other source of overpressure during test.

B. Perform the following tests on hydronic piping:

1. Use ambient temperature water as a testing medium unless there is risk of damage due to freezing. Another liquid that is safe for workers and compatible with piping may be used.
2. While filling system, use vents installed at high points of system to release air. Use drains installed at low points for complete draining of test liquid.
3. Isolate expansion tanks and determine that hydronic system is full of water.
4. Subject piping system to hydrostatic test pressure that is equal to 1.5 times the system's working pressure or 125 psi, whichever is greater. Test pressure shall not exceed maximum pressure for any vessel, pump, valve, or other component in system under test. Verify that stress due to pressure at bottom of vertical runs does not exceed 90 percent of specified minimum yield strength or 1.7 times "SE" value in Appendix A in ASME B31.9, "Building Services Piping."
5. After hydrostatic test pressure has been applied for at least 10 minutes, examine piping, joints, and connections for leakage. Eliminate leaks by tightening, repairing, or replacing components and repeat hydrostatic test until there are no leaks. Continue test for full duration.
6. Prepare written report of testing.

END OF SECTION 232113

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following air control devices, special duty valves and specialties for hydronic piping systems (hot-water heating, chilled water, condenser water, make-up water, heat pump loop and drains).

1. Air Control Devices

    a. Manual Air Vents

2. Hydronic Specialties

    a. Strainers
    b. Flexible coil connections

B. Related Section include the following:

1. Division 23 Section "Hydronic Piping" for piping systems.
2. Division 23 Section "Hydronic Pumps" for pumps, motors, and accessories for hydronic systems.
3. Division 23 Section “General Duty Valves for HVAC” for general duty valves not listed in this section.
4. Division 23 Section “Pipe Expansion Fittings and Loops” for expansion fittings.
5. Division 23 Section “HVAC Water Treatment” for accessories related to chemical water treatment and controls.

1.2 PERFORMANCE REQUIREMENTS

A. Hydronic piping components and installation shall be capable of withstanding the maximum working pressure and temperature of the associated system to which it is attached as specified in the Hydronic Piping specification but not less than 125-psig and 200 deg F.

1.3 SUBMITTALS

A. Product Data: For each type of the following:

1. Air Control Devices: Include flow and pressure drop data
2. Special Duty Valves: Include flow and pressure drop data.
3. Flow Balance Valves: Provide valve schedule for each coil, terminal unit or pump served, with valve type, flow rate and valve sizing data.
4. Hydronic Specialties, flexible connectors.

B. Operation and maintenance data: For air control devices, special duty valves and specialties.

1.4 QUALITY ASSURANCE

A. ASME Compliance: Comply with ASME B31.9, "Building Services Piping," for materials, products, and installation. Safety valves and pressure vessels shall bear the appropriate ASME label. Fabricate and stamp air separators and expansion tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.

PART 2 - PRODUCTS

2.1 AIR CONTROL DEVICES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following, unless noted otherwise:

1. Amtrol
2. Caleffi
3. Armstrong Pumps
4. Spirotherm
5. Taco
6. Bell & Gossett

B. Manual Air Vents:

1. Body: Bronze.
2. Internal Parts: Nonferrous.
3. Operator: Screwdriver or thumbscrew.
4. Inlet Connection: NPS 1/2.
5. Discharge Connection: NPS 1/8.
6. CWP Rating: 150 psig.
7. Maximum Operating Temperature: 225 deg F.

2.2 SPECIAL DUTY VALVES

A. Gate, Globe, Check, Ball, and Butterfly Valves: Comply with requirements specified in Division 23 Section "Valves."

B. Automatic Temperature-Control Valves, Actuators, and Sensors: Comply with requirements specified in Division 23 Section on Controls and Instrumentation.

C. Manual, Pressure-Dependent, Flow Balancing Valves, ½” to 2” size:

1. Manufacturers:

a. Armstrong Pumps - CBV
b. Nexus - Ultra MB (multi-turn plug) or Ultra XB (ball)
c. Flow Design - UA-SBS
d. Griswold Controls - Quick-Set

2. Body: Brass body, ball or plug type with calibrated orifice or venturi.
3. Ball: Stainless steel.
4. Plug: Brass or Resin.
5. Ball Seal: Teflon, PTFE.
6. End Connections: Threaded or socket (sweat).
7. Pressure Gage Connections: Integral seals for portable differential pressure meter.
8. Handle Style: Lever or multi-turn, with memory stop to retain set position.
9. CWP Rating: Minimum 125 psig.
10. Maximum Operating Temperature: 250 deg F.
11. Sizing: Select valve size at mid-range of coil/pump design flow.

D. Manual, Pressure-Dependent, Flow Balancing Valves, 2-1/2” and larger.

1. Manufacturers:

    a. Nexus - NVFB
    b. Flow Design - AF/AG/AW
    c. Griswold Controls - QuickSet

2. Body: Steel body, cast-iron butterfly valve with flow venturi.
3. Stem: Stainless steel.
4. Disc: Bronze.
5. Seat: EPDM.
6. End Connections: Flanged, welded or grooved.
7. Pressure Gage Connections: Integral seals for portable differential pressure meter.
8. Handle Style: Worm gear hand wheel, with memory stop to retain set position.
9. CWP Rating: Minimum 125 psig.
10. Maximum Operating Temperature: 250 deg F.
11. Sizing: Select valve size at mid-range of coil/pump design flow.

E. Automatic, Pressure Independent, Flow Balancing Valves, ½” to 2”:

1. Manufacturers:

    a. Griswold Controls - K Valve
    b. Flowcon - K Valve
    c. Flow Design - AC-SBS
    d. Nexus - UM

2. Body: Brass with replaceable flow cartridge.
3. Flow Cartridge Assembly: Stainless steel cartridge & spring, tamper proof, self cleaning, and removable.
4. Combination Assemblies: Include stainless steel ball valve.
5. End Connections: Threaded or socket (sweat).
6. Pressure Gage Connections: Integral seals for portable differential pressure meter.
7. Identification Tag: Marked with zone identification, valve number, and flow rate.
8. Performance: Maintain constant flow, plus or minus 5 percent over system pressure fluctuations.

9. Minimum CWP Rating: 175 psig.
10. Maximum Operating Temperature: 200 deg F.
11. Sizing: Select valve size at mid-range of coil/pump design flow.

F. Automatic, Pressure Independent, Flow Balancing Valves, 2-1/2" and larger:

1. Manufacturers:

   a. Griswold Controls - Wafer
   b. Flowcon - Wafer
   c. Flow Design - WS
   d. Nexus - UMW

2. Body: Ductile iron with multiple replaceable flow cartridge.
3. Flow Cartridge Assembly: Stainless steel cartridge & spring, tamper proof, self cleaning, and replaceable.
4. End Connections: Wafer style for mounting between flanges or butterfly valves. Contractor's option to use grooved or flange style bodies.
5. Pressure Gage Connections: Integral seals for portable differential pressure meter.
6. Identification Tag: Marked with zone identification, valve number, and flow rate.
7. Performance: Maintain constant flow, plus or minus 5 percent over system pressure fluctuations.
8. Minimum CWP Rating: 175 psig.
9. Maximum Operating Temperature: 200 deg F.
10. Sizing: Select valve size at mid-range of coil/pump design flow.

2.3 HYDRONIC SPECIALTIES

A. Venturis:

1. Acceptable Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Hyspan
   b. Nexus

2. Body: One-piece brass or bronze threaded ½" through 2" size. Sizes 2½" to 10" shall consist of one-piece steel, with weld or flanged ends.
3. Taps: Two built-in sensing taps, nipples, shut-off valves and quick connect couplings.
4. Identification: Identification tag on chain giving pipe size, venturi series, system, meter reading at minimum and maximum flow rates.
5. Size: Diameter and rating shall be selected by manufacturer for maximum accuracy and minimal pressure drop at full range of flows expected and to read between 20% and full scale range on a linear meter (i.e. between 10" and 50" on a 0-50" meter).
6. Flow Meter: Provide compatible, portable flow meter for use by test and balance agency for proper testing and reading of venturi flow rates.

B. Y-Pattern Strainers:

1. Acceptable Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Nibco
   b. Hammond
   c. Mueller
   d. FNW
   e. Nexus

2. Body: ASTM A 126, Class B, cast iron with bolted cover and bottom drain connection.
3. End Connections: Threaded ends for NPS 2 and smaller; flanged ends for NPS 2-1/2 and larger.
4. Strainer Screen: 20-mesh stainless steel strainer.
5. CWP Rating: 125 psig.

C. Flexible Pipe and Equipment Connectors:

1. Acceptable Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Flow Design
   b. Flex Weld Keflex
   c. Nexus

2. Refer to Division 23 Section “Pipe Expansion Fittings and Loops”, for pipeline and other main system expansion devices.
3. Fan coil unit, heat pumps and other terminal units: Unless noted or specified otherwise, provide 12” flexible braided stainless-steel hose connector at each pipe connection to the unit. Install connector in a straight line without offset. Piping to be supported so that connector does not carry load.
4.

PART 3 - EXECUTION

3.1 AIR CONTROL DEVICE INSTALLATION

A. Install manual air vents at heat-transfer coils and other high points in piping as required for system air venting. This includes high points for all branch piping to mechanical units. Install ‘cane’ shaped discharge tube positioned to permit draining to a portable receptacle or pipe to nearest floor drain.

3.2 VALVE APPLICATIONS

A. Install special duty valves in accessible locations close to connected equipment.

B. Unless otherwise specified by the device manufacturer, provide a minimum of 5 pipe diameters of straight unobstructed pipe length upstream of any electronic flow measurement device including electronic pressure independent control valves (ePIV).

C. Unless otherwise noted, install flow balancing valves in the return pipe of each heating or cooling terminal, at pump assemblies and elsewhere as indicated on drawings. Valve sizes shall be selected at mid-range of flow capacity, based on design flow of coil or pump being served.

1. Do not install balancing valve downstream of any two-way pressure independent control valve.
2. An automatic pressure-independent balancing valve shall be used downstream of any 3-way temperature control valve.

3.3 HYDRONIC SPECIALTIES INSTALLATION

A. Install hydronic specialties in accessible locations.

B. Install venturi downstream of any two-way pressure independent control valve for verification of flow rate and where otherwise indicated on the drawings. Provide the upstream and downstream straight piping dimensions recommended by manufacturer for proper flow reading.

C. Install strainers on inlets to control valves, pressure reducing valves, solenoid valves, in-line pumps, and elsewhere as indicated on the drawings.

D. Install NPS 3/4 nipple, ball valve and hose connection in blowdown connection of strainers NPS 2 and larger. Match size of blowdown connection for strainers smaller than NPS 2.

E. Install flexible pipe connectors on fan coil units, heat pumps and other devices where indicated.

3.4 FIELD QUALITY CONTROL

A. Prepare and perform hydronic piping tests according to Division 23 Section on hydronic piping.

END OF SECTION 232113

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following HVAC water-treatment systems:
   1. Chemical treatment test equipment.
   2. Flushing, cleaning and filling.
   3. HVAC water-treatment chemicals.
   4. Glycol mixture for freeze protection.

1.2 REFERENCES

A. American Society of Mechanical Engineers (ASME).

B. ASTM International:
   1. ASTM D859 – Standard Test Method for Silica in Water.
   2. ASTM D1067 – Standard Test Methods for Acidity or Alkalinity of Water.
   3. ASTM D1068 – Standard Test Methods for Iron in Water.
   4. ASTM D1126 – Standard Test Method for Hardness in Water.
   5. ASTM D3370 – Standard Practices for Sampling Water from Closed Conduits.

C. American Water Works Association (AWWA):
   1. AWWA C700 – Cold Water Meters-Displacement Type Bronze Main Case.

D. National Electrical Manufacturers Association (NEMA):
   1. NEMA 250 – Enclosures for Electrical Equipment.

E. National Fire Protection Association (NFPA):
   1. NFPA 70 – National Electrical Code (NEC).

1.3 SUBMITTALS

A. Product Data: For each type of equipment, device or product indicated.
   1. Glycol Anti-freeze characteristics.
   2. Water treatment equipment and devices.
   3. Chemicals and MSDS sheets.

B. Field quality-control test reports.
   1. Water Analysis: Test and report water quality available at Project site.
   2. Glycol mixture freeze protection temperature rating (test) for each system.
   3. Final system water quality test reports for each system.

C. Other Informational Submittals:
   1. Flushing and Cleaning Plan.
   2. Flushing and Cleaning Witness Forms.

3. Water-Treatment Program: Written sequence of operation on an annual basis for the application equipment required to achieve water quality defined in the "Performance Requirements" Article.
4. Water sample containers.

1.4 QUALITY ASSURANCE

A. HVAC Water-Treatment Service Provider Qualifications: An experienced HVAC water-treatment service provider capable of analyzing water qualities, installing water-treatment equipment, and applying water treatment as specified in this Section.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Water quality for HVAC systems shall minimize corrosion, scale buildup, and biological growth for optimum efficiency of HVAC equipment without creating a hazard to operating personnel or the environment.

B. Base HVAC water treatment on quality of water available at Project site, HVAC system equipment material characteristics and functional performance characteristics, operating personnel capabilities, and requirements and guidelines of authorities having jurisdiction.

C. Closed hydronic systems, including condenser water and chilled water, shall have the following water qualities:
1. pH: Maintain a value within 9.0 to 10.5.
2. "P" Alkalinity: Maintain a value within 100 to 500 ppm.
3. Boron: Maintain a value within 100 to 200 ppm.
4. Chemical Oxygen Demand: Maintain a maximum value of 100 ppm.
5. Soluble Copper: Maintain a maximum value of 0.20 ppm.
6. TDS: Maintain a maximum value of 10 ppm.
7. Ammonia: Maintain a maximum value of 20 ppm.
8. Free Caustic Alkalinity: Maintain a maximum value of 20 ppm.
9. Microbiological Limits:
    a. Total Aerobic Plate Count: Maintain a maximum value of 1000 organisms/ml.
    b. Total Anaerobic Plate Count: Maintain a maximum value of 100 organisms/ml.
    c. Nitrate Reducers: Maintain a maximum value of 100 organisms/ml.
    d. Sulfate Reducers: Maintain a maximum value of 0 organisms/ml.
    e. Iron Bacteria: Maintain a maximum value of 0 organisms/ml.

2.2 WATER TREATMENT COMPANIES

A. Approved Water Treatment Companies:
1. Flint Services, Incorporated.
2. King Total Water Systems.
3. Prior approved equal.

2.3 CHEMICAL WATER TREATMENT:

A. Chemical Properties:
1. Ferrous metal corrosion inhibitor shall provide corrosion protection by the use of sodium nitrite, sodium nitrate, and sodium hydroxide technique.
2. Nonferrous metal corrosion inhibitor product shall provide corrosion protection by the use of tolytriazole.
3. System shall be treated with biocides to prohibit biological growth within the closed system.
4. Furnish one year's supply of formula for control of biological growth, scale, sludge, and corrosion in the hydronic systems. Formulation shall not contain any ingredients which are harmful to system materials and construction.
5. The water treatment chemical and service supplier shall furnish basic water test equipment, including carrying case and reagents for use with the supplier's products and test equipment for determination of treatment residual. Where specialized or supplementary equipment is required, it shall be furnished as a part of the offering.

B. Glycol Anti-freeze Solutions:
1. System subject to potential freezing (hot water heating, chilled water, eat pump loops, closed circuit cooling towers, snow-melt) shall be filled with propylene glycol anti-freeze solutions.
2. Propylene glycol shall be DOWFROST HD inhibited propylene glycol.
3. Systems shall be filled with 30% glycol & 70% deionized water, pre-mixed solutions, unless noted otherwise (10°F freeze protection, – 20°F burst protection).
4. Test equipment for Dowfrost glycol or Tech. grade glycol shall be furnished and shall be approved by glycol manufacturer for testing their product.
5.

2.4 CHEMICAL TREATMENT TEST EQUIPMENT

A. Test Kit: Manufacturer-recommended equipment and chemicals in a wall-mounting cabinet for testing pH, TDS, inhibitor, chloride, alkalinity, and hardness; sulfite and testable polymer tests for high-pressure boilers, and oxidizing biocide test for open cooling systems.

B. Corrosion Test-Coupon Assembly: Constructed of corrosive-resistant material, complete with piping, valves, and mild steel and copper coupons. Locate copper coupon downstream from mild steel coupon in the test-coupon assembly.
1. Two-station rack for open and/or closed-loop systems.

2.5 CHEMICALS

A. Chemicals shall be as recommended by water-treatment system manufacturer that are compatible with piping system components and connected equipment, and that can attain water quality specified in "Performance Requirements" Article.

PART 3 - EXECUTION

3.1 WATER ANALYSIS

A. Perform an analysis of supply water to determine quality of water available at Project site. Provide copies of water chemistry analysis to A/E along with recommendations for chemical treatment program to meet specified system water quality levels.

3.2 INSTALLATION

A. Install chemical application equipment on stands or brackets as recommended by manufacturer. Maintain manufacturer's recommended clearances. Arrange units so controls and devices that require servicing are accessible.

B. Utilize existing glycol feeder. Connect outlet from pressure pump to system connection point. Fill tank with premixed glycol-water solution as specified, after system is filled and charged. Adjust pressure switch setpoint to match system fill pressure (expansion tank fill pressure). Test alarms and low-level pump lock-out safety.

3.3 CONNECTIONS

A. Coordinate location of required drain and fill valves with hydronic piping contractor so that all necessary flush and fill locations are properly located and provided.

3.4 SYSTEM CLEANING AND FLUSHING

A. All new piping systems shall be flushed, cleaned, disinfected, etc. by specified Water Treatment provider. Work shall be accomplished in accordance with the following requirements. Work shall be fully documented by means of certificates stating work accomplished, methods used and date work was done.

A. Existing piping systems: Where existing hydronic piping systems are to be maintained and reused for the permanent system, the existing piping shall be drained, flushed, cleaned, filled and treated in the same manner as new piping. New equipment, boilers, chillers, etc., shall not be connected to old, existing hydronic piping systems until the old systems have been cleaned.

B. Flushing and Cleaning Plan: Prepare a written plan for review and approval by the A/E for the methods and procedures to be used for flushing and cleaning each hydronic piping system.

1. Address phasing requirements when systems must be built and activated in multiple phases.
2. Address tie-in and drain points for each section of piping. Address location of temporary bypass lines, drains, etc.
3. Address plans for temporary isolation of factory cleaned equipment and coils, removal of control valves and auto-flow cartridges.
4. Address plans for circulating fluids with temporary pumps or the use of the system pumps (if approved by the A/E).
5. Address methods for determining when system is clean and the cleaning agents are considered rinsed out.
6. Discuss procedures for cleaning strainers.
7. Address final fill procedures, removal of bypasses, reinstallation of valves and cartridges, purging of all air, dosing of final chemical additives and system pressurization.
8. Address plans for legal disposal of fluids, glycol mixtures and/or cleaning agents.

C. Water Piping: Clean systems with chemicals as recommended by water treatment specialist.
   1. Pre-Cleaning Procedures:
      a. Pressure test piping as required.
      b. Isolate any existing system piping that is already cleaned and not part of the project new work.
      c. Install temporary bypass lines at all coils valve sets and all factory cleaned equipment. In lieu of temporary bypass lines, if approved by the Owner, temporarily remove control valves (and install bypasses), auto-flow cartridges and other pipe-line devices that could be plugged by debris during flushing.
      d. At terminal device coils consider temporarily removing coil connections and looping supply and return lines together during flushing.
      e. Make sure all start-up and system strainers are installed.
   2. Initial flushing: Flush system with clear water. Remove loose dirt, mill scale, metal chips, weld beads, rust, and like deleterious substances without damage to any system component. Provide temporary piping or hose to bypass coils, control valves, exchangers and other factory cleaned equipment unless acceptable means of protection are provided and subsequent inspection of hide-out areas takes place. Isolate or protect clean system components, including pumps and pressure vessels, and remove any component which may be damaged. Open all valves, drains, vents and strainers at all system levels. Remove plugs, caps, spool pieces, and components to facilitate early debris discharge from system. Sectionalize system to obtain debris carrying velocity of 1.8 m/s (6 feet per second), if possible. Connect dead-end supply and return headers as necessary. Flush bottoms of risers. Install temporary strainers where necessary to protect down-stream equipment. Supply and remove flushing water and drainage by various type hose, temporary and permanent piping and Contractor's booster pumps. Flush until clean as approved by the A/E. Have procedure witnessed and signed-off on Pipe Cleaning Record Witness Form.
   3. Cleaning: Re-fill system with clear water and add cleaning products, circulate systems at normal temperature to remove adherent organic soil, hydrocarbons, flux, pipe mill varnish, pipe joint compounds, iron oxide, and like deleterious substances not removed by flushing, without chemical or mechanical damage to

any system component. Removal of tightly adherent mill scale is not required. Keep isolated equipment which is "clean" and where dead-end debris accumulation cannot occur. Sectionalize system if possible, to circulate at velocities not less than 1.8 m/S (6 feet per second). Circulate each section for not less than four hours. Blow-down all strainers, or remove and clean as frequently as necessary. Drain and prepare for final flushing. Have procedure witnessed and signed-off on Pipe Cleaning Record Witness Form.

4. Final Flushing: Return systems to conditions required by initial flushing after all cleaning solution has been displaced by clean make-up. Flush all dead ends and isolated clean equipment. Gently operate all valves to dislodge any debris in valve body by throttling velocity. Flush for not less than one hour or until all cleaning chemicals are removed. Pull and clean all strainers. Remove start-up strainers on pumps and replace with final strainers. Have procedure witnessed and signed-off on Pipe Cleaning Record Witness Form.
5. Trim out system by removing temporary bypasses, drains, hoses, pumps, etc. and reinstall control valves, auto-flow cartridges, etc.
6. Fill system with approved treated fluid and chemicals treatment. Purge air from all coils, equipment, piping, etc. Pressurize system with make-up water valve or glycol feeder as applicable.

D. Hydronic Piping Systems Final Filling:
1. Provide test report confirming the parameters have been met and include a copy of the report in the O & M Manual.
    a. Provide certified water samples in sealed, clear plastic 1.0 gallon bottles at the beginning and end of each flush and fill stage, before glycol has been added. Treatment Contractor shall seal, sign, label and date each sample and turn over to A/E for proof of water quality.
2. Final Filling: After final cleaning is completed and tested, fill the systems as follows:
    a. Water Only Systems: Fill with clear water from building domestic supply.
    b. Glycol Anti-Freeze Systems: Fill with pre-mixed solution of propylene glycol and deionized water to the specified percentage of glycol.
3. Final Chemical Treatment: Add water treatment chemicals to achieve final water chemistry levels. Replace start-up strainers at suction diffusers and air separators with permanent strainers. Chemicals shall be non-toxic. Actuate all control valves during system cleaning and flushing.
4. Final Water Quality Report: Provide certified water quality analysis of final treated system water chemistry levels to confirm specified levels have been achieved.

E. Fluid Disposal

1. All excess fluids used in the water treatment activities shall be disposed of in a safe and legal manner. Obtain authorization from the local waste water agency before discharging chemically treated or anti-freeze glycol fluid solutions to floor drains. If local drainage to the sanitary system is not allowed, make arrangement to transport fluids off-site for disposal at an approved facility.

3.5 FIELD QUALITY CONTROL

A. Test, inspections and reports.
   1. Provide water analysis test report showing final chemistry levels for each system.
   2. Turn over sealed water samples for each system to A/E.
   3. Test and record freeze protection temperature levels for each glycol system.
   4. Test automatic chemical feed, bleed and measurement equipment for cooling tower systems and adjust dosing and feed timers to achieve required water quality.

B. Spare Chemical and Fluids:
   1. Provide sufficient water treatment chemicals, for the anticipated consumption rate, for a 1-year period.
   2. Glycol: During the course of the 1-year warranty period, the glycol feeder tank shall be replenished with pre-mixed glycol/water solution as necessary due to any loss in system fluid as a result of warranty work. Top off tank at the end of the 1-year warranty.

3.6 DEMONSTRATION

A. Water treatment provider to train Owner's maintenance personnel to adjust, operate, and maintain HVAC water-treatment systems and equipment. Refer to Division 1 Section "Demonstration and Training."

3.7 Piping System Cleaning Record Witness Form

System: _____

Pre Cleaning Check List:

	DNA	Yes	No	Initials	Date
System pressure tested					
System Temporary Bypasses & Drains Installed					
Construction screens installed in circulation pumps.					
Equipment Isolation Verified: - Control Valves removed or bypassed - Coil bypasses installed - Autoflow cartridges reomoved					
Comments: _____					

Cleaning Procedures:

Initial Flush:

Test Date: _____ Start Time: _____ Stop Time: _____

Comments: _____

Initials _____ Date _____

Addition of Cleaner :

Test Date: _____ Start Time: _____ Stop Time: _____

Chemical Used: _____ Amount: _____

Comments: _____

Initials _____ Date _____

Cleaner Flush :

Test Date: _____ Start Time: _____ Stop Time: _____

Comments: _____

Initials _____ Date _____

Final Fill & Addition of Inhibitor:

Chemical Used: _____ Amount: _____

Comments: _____

Initials _____ Date _____

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

A. This section includes design, performance criteria, refrigerants, controls, and installation requirements for air-cooled packaged chillers.

1.2 REFERENCES

A. Air-Conditioning, Heating, and Refrigeration Institute (ARI)
   1. ARI 550/590 – Standard for Water Chilling Packages Using the Vapor Compression Cycle.

B. American Society of Heating and Air-Conditioning Engineers (ASHRAE):
   1. ASHRAE Standard 147 – Reducing the Release of Halogenated Refrigerants from Refrigerating and Air-Conditioning Equipment and Systems.
   2. ASHRAE 15-1994 – Safety Code for Mechanical Refrigeration.

C. American Society of Mechanical Engineers (ASME):
   1. ASME - Boiler and Pressure Vessel Code

D. ASTM International:
   1. ASTM B117 – Standard Practice for Operating Salt Spray (Fog) Apparatus.

E. National Fire Protection Association (NFPA) 70 – National Electrical Code (NEC)

F. Underwriter Laboratories, Inc. (UL)
   1. UL 1995

1.3 SUBMITTALS

A. Product Data: For each product indicated.

B. Shop Drawings: Complete set of manufacturer's certified prints of water chiller assemblies, control panels, sections and elevations, and unit isolation.
   1. Include wiring diagrams.

C. Coordination Drawings: Floor plans drawn to scale and coordinated with the following:
   1. Structural supports.
   2. Piping roughing-in requirements.
   3. Wiring roughing-in requirements, including spaces reserved for electrical equipment.
   4. Access requirements, including working clearances for mechanical controls and electrical equipment, and tube pull and service clearances.

D. Source quality-control test reports.

E. Startup service reports.

F. Operation and maintenance data.

G. Warranties.

1.4 QUALITY ASSURANCE

A. ARI Certification: Signed by manufacturer certifying compliance with requirements in ARI 550/590, "Water Chilling Packages Using the Vapor Compression Cycle."

B. ASHRAE Certification: Signed by manufacturer certifying compliance with ASHRAE 15 for safety code for mechanical refrigeration. Comply with ASHRAE Standard 147 or refrigerant leaks, recovery, and handling and storage requirements.

C. ASME Compliance: Fabricate and label water chiller heat exchangers to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.

D. Comply with NFPA 70.

E. Comply with UL 1995.

F. Unit shall be full load run tested at the factory.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect and handle products to site under provisions of Section 23 00 00 – HVAC General Provisions.

B. Unit shall be stored and handled per unit manufacturer’s recommendations.

C. Unit controls shall be capable of withstanding 150 F (66 C) storage temperature in the control compartment for an indefinite period of time.

1.6 WARRANTY

A. Provide a 5 year warranty on compressors, coils and motors specified under this section. The warranty shall include parts, labor, travel costs to repair or replace products and systems within the first 12 months of service. The warranty for the remaining 48 months shall be for parts only.

B. Warranty: Include coverage of chiller package as manufactured and delivered to site.

PART 2 - PRODUCTS

2.1 AIR COOLED OIL-FREE CHILLERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide the products listed on the drawings or comparable products by one of the following Manufacturers:
   1. Smardt, Inc.
   2. Multi-Stack

B. General:
   1. Provide and install as shown on the plans, factory assembled air-cooled packaged chiller.
   2. Each unit shall include one or more Turbocor, oil-free, magnetic bearing, and variable-speed centrifugal compressors. Integrated variable frequency drive shall operate with inlet guide vanes to optimize part load efficiency. Chillers shall operate with HCF-134a refrigerant.
   3. The evaporator, condenser, and expansion valve shall be configured to operate as one refrigerant circuit. The chiller unit compressors shall be designed for mechanical and electrical isolation to facilitate service and removal.
   4. Performance: Refer to the schedule of performance on the drawings. The chiller shall be capable of stable operation down to 15 percent of full load without hot gas bypass. Performance shall be in accordance with ARI Standard 550/590-98. The unit shall be capable of operating at ambient temperatures down to 35°F, and high ambient temperatures up to 125°F

C. Chiller Components:
   1. Compressors:
      a. Compressors shall be of hermetic centrifugal design and operate 100% oil-free with two two-stages of compression, magnetic bearings, and integrated variable frequency drive system.
      b. Automatically positioned and controlled inlet guide vanes shall operate with compressor speed controls to provide optimum unit efficiency and stable operation at part loads.
   2. Motors:
      a. Permanent-magnet, synchronous hermetically sealed motor of sufficient size to effectively provide compressor horsepower requirements. Motor shall include soft-start capabilities with an inrush current of no more than 2 amps. Motor shall be liquid refrigerant cooled with internal thermal overload protection devices embedded in the winding of each phase.
      b. Compressor motor and chiller unit shall include variable-frequency speed controls to match cooling load demand to compressor speed and inlet guide vane position.
      c. Each compressor shall be equipped with a line reactor.
   3. Evaporator:
      a. Evaporator and condenser shall be shell-and-tube type and have separate shells. Heat exchangers shall be designed, constructed, tested and stamped according to the requirements of the ASME Code, Section VIII. In both the evaporator and condenser, refrigerant shall be in the shell and water inside the tubes. The water sides shall be designed for a minimum of

150 psig or as specified. Vents and drains shall be provided. The refrigerant side of each vessel shall bear the ASME Code stamp. Vessels shall pass a test pressure of 1.1 times the working pressure but not less than 100 psig. Provide intermediate tube supports spaced to enable equal liquid and gas flow across multiple compressor suction ports.

b. The evaporator shall be provided with spring loaded reseating-type pressure relief valves according to ASHRAE-15. The condenser shall be provided with dual relief valves equipped with a transfer valve so one valve can be removed for testing or replacement without loss of refrigerant or removal of refrigerant from the vessel. Rupture disks are not acceptable.

c. A perforated plate designed for vapor disengagement shall be installed inside the evaporator above the tubing to assure effective liquid droplet removal to prevent liquid damage to compressors and equalized suction pressure across evaporators with multiple compressors.

d. Tubes shall be individually replaceable and have internally and externally enhanced surfaces designed for refrigeration duty. Tubes shall have smooth full tube wall landings at the tube-sheet ends and at intermediate tube supports. Tubes shall be mechanically roller expanded into steel tube sheets containing a minimum of three concentric grooves.

e. Minimum evaporator exiting water temperature shall be 38°F. Minimum entering condenser water temperature shall be 55°F. Minimum inlet condenser water to outlet chilled water difference shall be 12°F.

4. Condenser:

a. The condenser coils shall have seamless copper tubing, mechanically bonded into aluminum plate-type fins. The fins shall have full drawn collars, completely covering the tubes for protection against atmospheric corrosion and to provide greater heat transfer. A sub-cooling coil shall be an integral part of the main condenser coil. All external coil surfaces shall be protected by PVC coated welded-wire-mesh grills. Condenser fans shall be propeller type, arranged for vertical air discharge and individually driven by direct drive motors. Each fan shall be housed in its own compartment to eliminate condenser-air cross flow during fan cycling and shall be equipped with a heavy-gauge close-meshed PVC coated fan guard. Fan motors shall be weather protected, three-phase, direct-drive, 1140 rpm, totally enclosed air-over motors with class F insulation or better. Open drip-proof (ODP) motors are not acceptable. Vertical service clearance under the condenser coil shall be minimum six feet for access to the compressor and major components. Horizontal condenser coils are not acceptable. The condenser shall permit pump-down and storage of the full refrigerant charge for compressor serviceability.

5. Refrigerant Circuit:

a. The unit shall have two or more refrigerant circuits, completely independent of each other. Each circuit shall be equipped with one compressor, one microprocessor controller, a factory-mounted control circuit transformer, oil separator, electronic expansion valve, compressor suction shutoff valve, combination discharge check and shutoff valve, liquid line shutoff valves, replaceable core filter-dryers, liquid line solenoid valve and sight-glass with moisture indicator. Each circuit shall be capable of operating independently, not being disabled in the event of fault(s) on the other circuit(s).

6. Unit casing and all structural members and rails shall be painted to meet ASTM B117, 500-hour salt-spray test. The control enclosure and unit panels shall be cleaned, phosphatized and then corrosion resistant urethane painted before assembly.
7. Advanced microprocessor based control system:
    a. The control system architecture shall provide distributed-control where each compressor circuit has its own microprocessor controller so in the event that one controller becomes inoperative, the other circuits will continue to operate uninterrupted.
    b. Control Panel: A NEMA Type 3R weatherproof control panel shall contain the unit control system, control interlock terminals and field-power connection points. Hinged control panel access doors shall be lockable. Barrier panels shall be provided to protect against accidental contact with line voltage when accessing the control system.
        1) Factory-supplied power components shall include: single-point power connection with circuit breaker, factory-mounted non-fused type service disconnect switch, individual contactors and circuit breakers for fan motors, circuit breakers and factory mounted transformers for each control-circuit, terminals for power supply to the evaporator heater circuit, and 115 volt 15 amp. ground-fault protected service-convenience outlet. Fan motors shall have inherent overload protection and compressor motors shall have three-phase motor overload protection.
        2) Control system starting components shall include solid-state start timer.
        3) The control logic shall be designed to maximize operating efficiency and equipment life with protections for operation under unusual conditions and to provide a history of operating conditions. The system shall intelligently stage the unit to sustain leaving water temperature precision and stability while minimizing compressor cycling.
        4) Equipment protection functions controlled by the microprocessor shall include high discharge pressure, loss of refrigerant, loss of water flow, freeze protection, and low refrigerant pressure.
        5) User controls shall include auto/stop switch, chilled water set-point adjustment, anti-recycle timer, and digital display with water temperature and set-point, operating temperatures and pressures, and diagnostic messages.
        6) The following features and functions shall be included:
            a) Durable liquid crystal display (LCD) screen type, having minimum four 20-character lines with 6 key input pad conveniently mounted on the unit controller. Default language and units of measure shall be English and I-P respectively. Messages shall be in plain English. Coded messages, LED indicators and LED displays are not acceptable
            b) Separate control section and password protection for critical parameters.
            c) Remote reset of chilled water temperature using a 4-20mA signal.

d) Soft-load operation, protecting the compressor by preventing full-load operation during the initial chilled fluid pull-down period.
e) BAS communication flexibility through protocol selectability. Optional modular plug-ins that enable the unit controller to communicate using standardized protocols such as BACnet®, MODBUS® and LONWORKS®.
f) Non-volatile program memory allowing auto-restart after a power failure without requiring a UPS (un-interruptible power supply).
g) Recording of safety shutdowns, including date-and-time stamp with system temperatures and pressures. A minimum of six previous occurrences shall be maintained in a revolving memory.
h) Start-to-start and stop-to-start cycle timers, further optimizing motor protection.
i) Lead-lag compressor staging for part-load operation by manual selection or automatically by circuit run hours.
j) Discharge pressure control through intelligent cycling of condenser fans to maximize efficiency.
k) Pro-active compressor unloading when selected operating parameters exceed design settings, such as high discharge pressure or low evaporator pressure.
l) Diagnostic monitoring of unit operation, providing a pre-alarm signal in advance of a potential shutdown, allowing time for corrective action.

8. Factory mounted DDC controller(s) shall support operation via BACnet® Open Standard Protocol using either BACnet MS/TP, BACnet IP or BACnet Ethernet data link / physical layer as specified by the Building Automation System (BAS) supplier. The information communicated between the BAS and the factory mounted unit controllers shall include the reading and writing of data to allow unit monitoring, control and alarm notification as specified in the unit sequence of operation and the unit points list. All communication from the chiller unit controller as specified in the points list shall be via standard BACnet objects. Proprietary BACnet objects shall not be allowed. BACnet communications shall conform to the BACnet protocol (ANSI/ASHRAE135-2001). A BACnet Protocol Implementation Conformance Statement (PICS) shall be provided along with the unit submittal.
9. Options And Accessories
    a. Vibration Control Mountings: High deflection, minimum 1 inch, spring vibration isolators for field installation.
    b. Chilled water flow switch to be factory mounted in the chilled water outlet nozzle and factory wired to terminals in the control panel.
    c. Single point power connection.

PART 3 - EXECUTION

3.1 CHILLER INSTALLATION

A. Install water chillers on concrete base. Concrete base is specified in Section 23 05 00 - Basic Materials and Methods for HVAC, and concrete materials and installation requirements are specified in Division 3.

B. Concrete Bases: Anchor chiller mounting frame to concrete base.
   1. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of concrete base.
   2. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
   3. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
   4. Install anchor bolts to elevations required for proper attachment to supported equipment.
   5. Cast-in-place concrete materials and placement requirements are specified in Division 3.

C. Vibration Isolation: Rubber pads with a minimum deflection of 0.25 inch. Vibration isolation devices and installation requirements are specified in Section 23 05 48 - Mechanical Vibration Controls.

D. Maintain manufacturer's recommended clearances for service and maintenance.

E. Install separate devices furnished by manufacturer.

3.2 CONNECTIONS

A. Chilled-water piping installation requirements are specified in Section 23 21 13 - Hydronic Piping.

B. Install piping adjacent to chiller to allow service and maintenance.

C. Evaporator Connections: Connect inlet to evaporator with controller-bulb well, shutoff valve, thermometer, strainer, pressure gage, and union or flange. Connect outlet to evaporator with shutoff valve, flow switch, balancing valve, thermometer, pressure gage, and union or flange.

D. Ground chillers according to Division 26 Section "Grounding and Bonding."

E. Connect wiring according to Division 26 Section "Conductors and Cables."

3.3 STARTUP SERVICE

A. Inspect field-assembled components, equipment installation, and piping and electrical connections for proper assemblies, installations, and connections.

B. Complete installation and startup checks according to manufacturer's written instructions and perform the following:
   1. Verify that refrigerant charge is sufficient and water chiller has been leak tested.
   2. Verify that pumps are installed and functional.
   3. Verify that thermometers and gages are installed.
   4. Operate water chiller for run-in period according to manufacturer's written instructions.
   5. Check bearing lubrication and oil levels.
   6. Verify that refrigerant pressure relief is vented outside (for water-cooled water chillers).
   7. Verify proper motor rotation.
   8. Verify static deflection of vibration isolators, including deflection during water chiller startup and shutdown.
   9. Delete option in first subparagraph below for air-cooled water chillers.
   10. Verify and record performance of chilled-water flow and low-temperature interlocks.
   11. Verify and record performance of water chiller protection devices.
   12. Test and adjust controls and safeties. Replace damaged or malfunctioning controls and equipment.

C. Prepare a written startup report that records results of tests and inspections.

D. 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 site outside normal occupancy hours for this purpose.

END OF SECTION 23 64 25

PART 2 PRODUCTS

1.01 MATERIALS AND EQUIPMENT

A. Materials and equipment for patching and extending work: As specified in individual sections.

PART 3 EXECUTION

2.01 PREPARATION

A. Provide temporary wiring and connections to maintain existing systems in service during construction. When work must be performed on energized equipment or circuits, use personnel experienced in such operations.

B. Existing Electrical Service: Maintain existing system in service until new system is complete and ready for service. Disable system only to make switchovers and connections. Minimize outage duration.

END OF SECTION

PART 1 GENERAL

1.01 SUBMITTALS

A. Product Data: Provide manufacturer's standard catalog pages and data sheets for conductors and cables, including detailed information on materials, construction, ratings, listings, and available sizes, configurations, and stranding.

1.02 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

PART 2 PRODUCTS

2.01 CONDUCTOR AND CABLE APPLICATIONS

A. Do not use conductors and cables for applications other than as permitted by NFPA 70 and product listing.

B. Provide single conductor building wire installed in suitable raceway unless otherwise indicated, permitted, or required.
   1. Exceptions:
      a. Use variable-frequency drive cable for connection between variable-frequency motor controllers and associated motors.

2.02 CONDUCTOR AND CABLE GENERAL REQUIREMENTS

A. Provide products that comply with requirements of NFPA 70.

B. Provide products listed, classified, and labeled as suitable for the purpose intended.

C. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, etc. as required for a complete operating system.

D. Comply with NEMA WC 70.

E. Thermoplastic-Insulated Conductors and Cables: Listed and labeled as complying with UL 83.

F. Thermoset-Insulated Conductors and Cables: Listed and labeled as complying with UL 44.

G. Conductor Material:
   1. Provide copper conductors only. Aluminum conductors are not acceptable for this project. Conductor sizes indicated are based on copper.

2. Copper Conductors: Soft drawn annealed, 98 percent conductivity, uncoated copper conductors complying with ASTM B3, ASTM B8, or ASTM B787/B787M unless otherwise indicated.
3. Tinned Copper Conductors: Comply with ASTM B33.

H. Minimum Conductor Size:
1. Branch Circuits: 12 AWG.

I. Conductor Color Coding:
1. Color code conductors as indicated unless otherwise required by the authority having jurisdiction. Maintain consistent color coding throughout project.
2. Color Coding Method: Integrally colored insulation.
3. Color Code:
a. 480Y/277 V, 3 Phase, 4 Wire System:
1) Phase A: Brown.
2) Phase B: Orange.
3) Phase C: Yellow.
4) Neutral/Grounded: Gray.
b. 208Y/120 V, 3 Phase, 4 Wire System:
1) Phase A: Black.
2) Phase B: Red.
3) Phase C: Blue.
4) Neutral/Grounded: White.
c. Equipment Ground, All Systems: Green.

2.03 SINGLE CONDUCTOR BUILDING WIRE

A. Description: Single conductor insulated wire.

B. Conductor Stranding:
1. Feeders and Branch Circuits:
a. Size 10 AWG and Smaller: Solid.
b. Size 8 AWG and Larger: Stranded.

C. Insulation Voltage Rating: 600 V.

D. Insulation:
1. Copper Building Wire: Type THHN/THWN or THHN/THWN-2, except as indicated below.
a. Installed Underground: Type XHHW-2.

2.04 VARIABLE-FREQUENCY DRIVE CABLE

A. Description: Flexible motor supply cable listed and labeled as complying with UL 2277 in accordance with NFPA 79; specifically designed for use with variable frequency drives and associated nonlinear power distortions.

B. Conductor Stranding: Stranded.

C. Insulation Voltage Rating: 1000 V.

D. Insulation: Use only thermoset insulation types; thermoplastic insulation types are not permitted.

E. Grounding: Full-size integral equipment grounding conductor or symmetrical arrangement of multiple conductors of equivalent size.

F. Provide metallic shielding.

G. Jacket: PVC or Chlorinated Polyethylene (CPE).

2.05 WIRING CONNECTORS

A. Description: Wiring connectors appropriate for the application, suitable for use with the conductors to be connected, and listed as complying with UL 486A-486B or UL 486C as applicable.

B. Do not use insulation-piercing or insulation-displacement connectors designed for use with conductors without stripping insulation.

C. Do not use push-in wire connectors as a substitute for twist-on insulated spring connectors.

2.06 ACCESSORIES

A. Electrical Tape:
   1. Vinyl Insulating Electrical Tape: Complying with ASTM D3005 and listed as complying with UL 510; minimum thickness of 7 mil (0.18 mm); resistant to abrasion, corrosion, and sunlight; conformable for application down to 0 degrees F (-18 degrees C) and suitable for continuous temperature environment up to 221 degrees F (105 degrees C).

B. Wire Pulling Lubricant:
   1. Listed and labeled as complying with UL 267.
   2. Suitable for use with conductors/cables and associated insulation/jackets to be installed.
   3. Suitable for use at installation temperature.

C. Cable Ties: Material and tensile strength rating suitable for application.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Perform work in accordance with NECA 1 (general workmanship).

C. Secure and support conductors and cables in accordance with NFPA 70 using suitable supports and methods approved by the authority having jurisdiction. Provide independent support from building structure. Do not provide support from raceways, piping, ductwork, or other systems.

D. Variable-Frequency Drive Cable: Terminate shielding at both variable-frequency motor controller and associated motor using glands or termination kits recommended by manufacturer.

E. Install conductors with a minimum of 12 inches (300 mm) of slack at each outlet.

F. Make wiring connections using specified wiring connectors.

G. Insulate splices and taps that are made with uninsulated connectors using methods suitable for the application, with insulation and mechanical strength at least equivalent to unspliced conductors.

H. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 078400.

I. Unless specifically indicated to be excluded, provide final connections to all equipment and devices, including those furnished by others, as required for a complete operating system.

END OF SECTION

PART 1 GENERAL

1.01 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

PART 2 PRODUCTS

2.01 GROUNDING AND BONDING REQUIREMENTS

A. Do not use products for applications other than as permitted by NFPA 70 and product listing.

B. Unless specifically indicated to be excluded, provide all required components, conductors, connectors, conduit, boxes, fittings, supports, accessories, etc. as necessary for a complete grounding and bonding system.

C. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

D. Bonding and Equipment Grounding:
   1. Provide bonding for equipment grounding conductors, equipment ground busses, metallic equipment enclosures, metallic raceways and boxes, device grounding terminals, and other normally non-current-carrying conductive materials enclosing electrical conductors/equipment or likely to become energized as indicated and in accordance with NFPA 70.
   2. Provide insulated equipment grounding conductor in each feeder and branch circuit raceway. Do not use raceways as sole equipment grounding conductor.
   3. Where circuit conductor sizes are increased for voltage drop, increase size of equipment grounding conductor proportionally in accordance with NFPA 70.
   4. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
   5. Terminate branch circuit equipment grounding conductors on solidly bonded equipment ground bus only. Do not terminate on neutral (grounded) or isolated/insulated ground bus.
   6. Provide bonding jumper across expansion or expansion/deflection fittings provided to accommodate conduit movement.

2.02 GROUNDING AND BONDING COMPONENTS

A. General Requirements:
   1. Provide products listed, classified, and labeled as suitable for the purpose intended.
   2. Provide products listed and labeled as complying with UL 467 where applicable.

B. Conductors for Grounding and Bonding, in Addition to Requirements of Section 260526:
   1. Use insulated copper conductors unless otherwise indicated.

a. Exceptions:
   1) Use bare copper conductors where installed underground in direct contact with earth.

C. Connectors for Grounding and Bonding:
   1. Description: Connectors appropriate for the application and suitable for the conductors and items to be connected; listed and labeled as complying with UL 467.
   2. Unless otherwise indicated, use exothermic welded connections for underground, concealed and other inaccessible connections.
   3. Unless otherwise indicated, use mechanical connectors, compression connectors, or exothermic welded connections for accessible connections.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Perform work in accordance with NECA 1 (general workmanship).

C. Make grounding and bonding connections using specified connectors.
   1. Remove nonconductive paint, enamel, or similar coating at threads, contact points, and contact surfaces.

END OF SECTION

PART 1 GENERAL

1.01 SUBMITTALS

A. Installer's qualification statement.

1.02 QUALITY ASSURANCE

A. Installer Qualifications for Powder-Actuated Fasteners: Certified by fastener system manufacturer with current operator's license.

PART 2 PRODUCTS

2.01 SUPPORT AND ATTACHMENT COMPONENTS

A. General Requirements:
   1. Comply with the following. Where requirements differ, comply with most stringent.
      a. NFPA 70.
      b. Applicable building code.
      c. Requirements of authorities having jurisdiction.
   2. Provide required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for complete installation of electrical work.
   3. Provide products listed, classified, and labeled as suitable for purpose intended, where applicable.
   4. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for load to be supported with minimum safety factor of [_____]. Include consideration for vibration, equipment operation, and shock loads where applicable.
   5. Do not use products for applications other than as permitted by NFPA 70 and product listing.
   6. Steel Components: Use corrosion-resistant materials suitable for environment where installed.
      a. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
      b. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.

B. Conduit and Cable Supports: Straps and clamps suitable for conduit or cable to be supported.
   1. Conduit Straps: One-hole or two-hole type; steel or malleable iron.
   2. Conduit Clamps: Bolted type unless otherwise indicated.

C. Metal Channel/Strut Framing Systems:
   1. Description: Factory-fabricated, continuous-slot, metal channel/strut and associated fittings, accessories, and hardware required for field assembly of supports.
   2. Comply with MFMA-4.

D. Hanger Rods: Threaded, zinc-plated steel unless otherwise indicated.

E. Anchors and Fasteners:
   1. Unless otherwise indicated and where not otherwise restricted, use anchor and fastener types indicated for specified applications.
   2. Post-Installed Concrete and Masonry Anchors: Evaluated and recognized by ICC Evaluation Service, LLC (ICC-ES) for compliance with applicable building code.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install hangers and supports in accordance with NECA 1.

C. Install anchors and fasteners in accordance with ICC Evaluation Services, LLC (ICC-ES) evaluation report conditions of use where applicable.

D. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.

E. Unless specifically indicated or approved by owner, do not provide support from suspended ceiling support system or ceiling grid.

F. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.

G. Equipment Support and Attachment:
   1. Use metal, fabricated supports or supports assembled from metal channel/strut to support equipment as required.
   2. Use metal channel/strut secured to studs to support equipment surface mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
   3. Use metal channel/strut to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
   4. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.

END OF SECTION

PART 1 GENERAL

1.01 SUBMITTALS

A. Product Data: Provide manufacturer's standard catalog pages and data sheets for conduits and fittings.

PART 2 PRODUCTS

2.01 CONDUIT APPLICATIONS

A. Do not use conduit and associated fittings for applications other than as permitted by NFPA 70, manufacturer's instructions, and product listing.

B. Unless otherwise indicated and where not otherwise restricted, use conduit types indicated for specified applications. Where more than one listed application applies, comply with most restrictive requirements. Where conduit type for particular application is not specified, use galvanized steel rigid metal conduit.

C. Underground:
1. Exterior, Direct-Buried: Use galvanized steel rigid metal conduit (RMC), galvanized steel intermediate metal conduit (IMC), or rigid PVC conduit.
2. Where rigid polyvinyl chloride (PVC) conduit is provided, transition to galvanized steel rigid metal conduit (RMC) or galvanized steel intermediate metal conduit (IMC) where emerging from underground.
3. Where rigid polyvinyl (PVC) conduit larger than 2-inch (53 mm) trade size is provided, use galvanized steel rigid metal conduit (RMC) elbows, galvanized steel intermediate metal conduit (IMC) elbows, PVC-coated galvanized steel rigid metal conduit (RMC) elbows, or concrete-encased PVC elbows for bends.

D. Exposed, Interior, Not Subject to Physical Damage: Use galvanized steel rigid metal conduit (RMC), galvanized steel intermediate metal conduit (IMC), or galvanized steel electrical metallic tubing (EMT).

E. Exposed, Exterior, Not Subject to Severe Physical Damage: Use galvanized steel rigid metal conduit (RMC) or galvanized steel intermediate metal conduit (IMC).

F. Flexible Connections to Vibrating Equipment:
1. Dry Locations: Use flexible metal conduit (FMC).
2. Damp, Wet, or Corrosive Locations: Use liquidtight flexible metal conduit (LFMC).
3. Maximum Length: 6 feet (1.8 m) unless otherwise indicated.

2.02 CONDUIT - GENERAL REQUIREMENTS

A. Comply with NFPA 70.

B. Provide conduit, fittings, supports, and accessories required for complete raceway system.

C. Provide products listed, classified, and labeled as suitable for purpose intended.

D. Where conduit size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

2.03 GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

A. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6.

B. Fittings:
1. Nonhazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B or UL 6.
2. Material: Use steel or malleable iron.
3. Connectors and Couplings: Use threaded type fittings only. Threadless fittings, including set screw and compression/gland types, are not permitted.

2.04 GALVANIZED STEEL INTERMEDIATE METAL CONDUIT (IMC)

A. Description: NFPA 70, Type IMC galvanized steel intermediate metal conduit complying with ANSI C80.6 and listed and labeled as complying with UL 1242.

B. Fittings:
1. Nonhazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B or UL 1242.
2. Material: Use steel or malleable iron.
3. Connectors and Couplings: Use threaded type fittings only. Threadless fittings, including set screw and compression/gland types, are not permitted.

2.05 PVC-COATED GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

A. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit with external polyvinyl chloride (PVC) coating complying with NEMA RN 1 and listed and labeled as complying with UL 6.

B. Exterior Coating: Polyvinyl chloride (PVC), nominal thickness of 40 mil, 0.040 inch (1.02 mm).

C. PVC-Coated Boxes and Fittings:
1. Manufacturer: Same as manufacturer of PVC-coated conduit to be installed.
2. Nonhazardous Locations: Use boxes and fittings listed and labeled as complying with UL 514A, UL 514B, or UL 6.
3. Material: Use steel or malleable iron.
4. Exterior Coating: Polyvinyl chloride (PVC), minimum thickness of 40 mil, 0.040 inch (1.02 mm).

D. PVC-Coated Supports: Furnish with exterior coating of polyvinyl chloride (PVC), minimum thickness of 15 mil, 0.015 inch (0.38 mm).

2.06 FLEXIBLE METAL CONDUIT (FMC)

A. Description: NFPA 70, Type FMC standard-wall steel flexible metal conduit listed and labeled as complying with UL 1, and listed for use in classified firestop systems.

B. Fittings:
1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
2. Material: Use steel or malleable iron.

2.07 LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC)

A. Description: NFPA 70, Type LFMC polyvinyl chloride (PVC) jacketed steel flexible metal conduit listed and labeled as complying with UL 360.

B. Fittings:
1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
2. Material: Use steel or malleable iron.

2.08 GALVANIZED STEEL ELECTRICAL METALLIC TUBING (EMT)

A. Description: NFPA 70, Type EMT galvanized steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797.

B. Fittings:
1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
2. Material: Use steel or malleable iron.
3. Connectors and Couplings: Use compression/gland or set-screw type.
a. Do not use indenter type connectors and couplings.

2.09 RIGID POLYVINYL CHLORIDE (PVC) CONDUIT

A. Description: NFPA 70, Type PVC rigid polyvinyl chloride conduit complying with NEMA TC 2 and listed and labeled as complying with UL 651; Schedule 40 unless otherwise indicated, Schedule 80 where subject to physical damage; rated for use with conductors rated 90 degrees C.

B. Fittings:
1. Manufacturer: Same as manufacturer of conduit to be connected.
2. Description: Fittings complying with NEMA TC 3 and listed and labeled as complying with UL 651; material to match conduit.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install conduit in accordance with NECA 1.

C. Install galvanized steel rigid metal conduit (RMC) in accordance with NECA 101.

D. Install intermediate metal conduit (IMC) in accordance with NECA 101.

E. Install PVC-coated galvanized steel rigid metal conduit (RMC) using only tools approved by manufacturer.

F. Install rigid polyvinyl chloride (PVC) conduit in accordance with NECA 111.

G. Conduit Routing:
   1. Arrange conduit to provide no more than equivalent of four 90-degree bends between pull points.
   2. Arrange conduit to provide no more than 150 feet (46 m) between pull points.
   3. Arrange conduit to prevent moisture traps. Provide drain fittings at low points and at sealing fittings where moisture may collect.

H. Conduit Support:
   1. Secure and support conduits in accordance with NFPA 70 using suitable supports and methods approved by authorities having jurisdiction; see Section 260529.
   2. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.

I. Connections and Terminations:
   1. Use approved zinc-rich paint or conduit joint compound on field-cut threads of galvanized steel conduits prior to making connections.
   2. Where two threaded conduits must be joined and neither can be rotated, use three-piece couplings or split couplings. Do not use running threads.
   3. Provide drip loops for liquidtight flexible conduit connections to prevent drainage of liquid into connectors.
   4. Terminate threaded conduits in boxes and enclosures using threaded hubs or double lock nuts for dry locations and raintight hubs for wet locations.
   5. Provide insulating bushings, insulated throats, or listed metal fittings with smooth, rounded edges at conduit terminations to protect conductors.

J. Penetrations:
   1. Do not penetrate or otherwise notch or cut structural members, including footings and grade beams, without approval of Structural Engineer.
   2. Provide sleeves for penetrations as indicated or as required to facilitate installation. Set sleeves flush with exposed surfaces unless otherwise indicated or required.
   3. Where conduits penetrate waterproof membrane, seal as required to maintain integrity of membrane.
   4. Make penetrations for roof-mounted equipment within associated equipment openings and curbs where possible to minimize roofing system penetrations. Where penetrations are necessary, seal as indicated or as required to preserve integrity of roofing system and maintain roof warranty.
   5. Install firestopping to preserve fire resistance rating of partitions and other elements.

K. Underground Installation:
   1. Minimum Cover, Unless Otherwise Indicated or Required:

a. Underground, Exterior: 18 inches (460 mm).

L. Concrete Encasement: Where conduits not otherwise embedded within concrete are indicated to be concrete-encased, provide minimum concrete cover of 3 inches (76 mm) on all sides unless otherwise indicated; see Section 033000.

M. Conduit Movement Provisions: Where conduits are subject to movement, provide expansion and expansion/deflection fittings to prevent damage to enclosed conductors or connected equipment. This includes, but is not limited to:
1. Where conduits cross structural joints intended for expansion, contraction, or deflection.
2. Where calculated in accordance with NFPA 70 for rigid polyvinyl chloride (PVC) conduit installed above ground to compensate for thermal expansion and contraction.
3. Where conduits are subject to earth movement by settlement or frost.

N. Conduit Sealing:
1. Use foam conduit sealant to prevent entry of moisture and gases. This includes, but is not limited to:
   a. Where conduits enter building from outside.
   b. Where service conduits enter building from underground distribution system.
   c. Where conduits enter building from underground.
   d. Where conduits may transport moisture to contact live parts.
2. Where conduits cross barriers between areas of potential substantial temperature differential, use foam conduit sealant at accessible point near penetration to prevent condensation. This includes, but is not limited to:
   a. Where conduits pass from outdoors into conditioned interior spaces.
   b. Where conduits pass from unconditioned interior spaces into conditioned interior spaces.

O. Provide pull string in each empty conduit and in conduits where conductors and cables are to be installed by others. Leave minimum slack of 12 inches (300 mm) at each end.

END OF SECTION

PART 1 GENERAL

1.01 SUBMITTALS

A. Product Data: Provide manufacturer's standard catalog pages and data sheets for cabinets and enclosures and underground boxes/enclosures.

1.02 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

PART 2 PRODUCTS

2.01 BOXES

A. General Requirements:
   1. Do not use boxes and associated accessories for applications other than as permitted by NFPA 70 and product listing.
   2. Provide all boxes, fittings, supports, and accessories required for a complete raceway system and to accommodate devices and equipment to be installed.
   3. Provide products listed, classified, and labeled as suitable for the purpose intended.
   4. Where box size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
   5. Provide grounding terminals within boxes where equipment grounding conductors terminate.

B. Outlet and Device Boxes Up to 100 cubic inches (1,650 cu cm), Including Those Used as Junction and Pull Boxes:
   1. Use sheet-steel boxes for dry locations unless otherwise indicated or required.
   2. Use cast iron boxes or cast aluminum boxes for damp or wet locations unless otherwise indicated or required; furnish with compatible weatherproof gasketed covers.
   3. Use suitable masonry type boxes where flush-mounted in masonry walls.
   4. Use raised covers suitable for the type of wall construction and device configuration where required.
   5. Do not use "through-wall" boxes designed for access from both sides of wall.
   6. Sheet-Steel Boxes: Comply with NEMA OS 1, and list and label as complying with UL 514A.
   7. Cast Metal Boxes: Comply with NEMA FB 1, and list and label as complying with UL 514A; furnish with threaded hubs.
   8. Boxes for Ganged Devices: Use multigang boxes of single-piece construction. Do not use field-connected gangable boxes unless specifically indicated or permitted.

C. Cabinets and Enclosures, Including Junction and Pull Boxes Larger Than 100 cubic inches (1,650 cu cm):

1. Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E, or UL 508A.
2. Junction and Pull Boxes Larger Than 100 cubic inches (1,650 cu cm):
   a. Provide screw-cover or hinged-cover enclosures unless otherwise indicated.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install boxes in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards where mounting heights are not indicated.

C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.

D. Unless otherwise indicated, provide separate boxes for line voltage and low voltage systems.

E. Unless otherwise indicated, boxes may be surface-mounted where exposed conduits are indicated or permitted.

F. Box Supports:
   1. Secure and support boxes in accordance with NFPA 70 and Section 260529 using suitable supports and methods approved by the authority having jurisdiction.
   2. Provide independent support from building structure except for cast metal boxes (other than boxes used for fixture support) supported by threaded conduit connections in accordance with NFPA 70. Do not provide support from piping, ductwork, or other systems.

G. Install boxes as required to preserve insulation integrity.

H. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.

I. Install firestopping to preserve fire resistance rating of partitions and other elements.

END OF SECTION

PART 1 GENERAL

1.01 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

PART 2 PRODUCTS

2.01 RACEWAY REQUIREMENTS

A. Provide all components, fittings, supports, and accessories required for a complete raceway system.

B. Provide products listed, classified, and labeled as suitable for the purpose intended.

C. Do not use raceways for applications other than as permitted by NFPA 70 and product listing.

2.02 SURFACE RACEWAY SYSTEMS

A. Surface Metal Raceways: Listed and labeled as complying with UL 5.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Perform work in accordance with NECA 1 (general workmanship).

C. Install raceways plumb and level.

D. Secure and support raceways in accordance with Section 260529 at intervals complying with NFPA 70 and manufacturer's requirements.

E. Close unused raceway openings.

END OF SECTION

PART 1 GENERAL

1.01 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

PART 2 PRODUCTS

2.01 IDENTIFICATION REQUIREMENTS

A. Identification for Equipment:
   1. Use identification nameplate to identify each piece of electrical distribution and control equipment and associated sections, compartments, and components.
      a. Enclosed switches, circuit breakers, and motor controllers:
         1) Identify voltage and phase.
         2) Identify power source and circuit number. Include location when not within sight of equipment.
         3) Identify load(s) served. Include location when not within sight of equipment.
   2. Use identification nameplate to identify disconnect location for equipment with remote disconnecting means.

B. Identification for Conductors and Cables:
   1. Color Coding for Power Conductors 600 V and Less: Comply with Section 260519.
   2. Use identification nameplate or identification label to identify color code for ungrounded and grounded power conductors inside door or enclosure at each piece of feeder or branch-circuit distribution equipment when premises has feeders or branch circuits served by more than one nominal voltage system.
   3. Use underground warning tape to identify direct buried cables.

2.02 IDENTIFICATION NAMEPLATES AND LABELS

A. Identification Nameplates:
   1. Materials:
      a. Indoor Clean, Dry Locations: Use plastic nameplates.
      b. Outdoor Locations: Use plastic, stainless steel, or aluminum nameplates suitable for exterior use.
   2. Plastic Nameplates: Two-layer or three-layer laminated acrylic or electrically non-conductive phenolic with beveled edges; minimum thickness of 1/16 inch (1.6 mm); engraved text.
   3. Stainless Steel Nameplates: Minimum thickness of 1/32 inch (0.8 mm); engraved or laser-etched text.
   4. Aluminum Nameplates: Anodized; minimum thickness of 1/32 inch (0.8 mm); engraved or laser-etched text.

B. Identification Labels:

1. Materials: Use self-adhesive laminated plastic labels; UV, chemical, water, heat, and abrasion resistant.
2. Text: Use factory pre-printed or machine-printed text. Do not use handwritten text unless otherwise indicated.

C. Format for Equipment Identification:
1. Minimum Size: 1 inch (25 mm) by 2.5 inches (64 mm).
2. Legend:
   a. Equipment designation or other approved description.
3. Text: All capitalized unless otherwise indicated.
4. Minimum Text Height:
   a. Equipment Designation: 1/2 inch (13 mm).
5. Color:
   a. Normal Power System: White text on black background.

2.03 UNDERGROUND WARNING TAPE

A. Materials: Use foil-backed detectable type polyethylene tape suitable for direct burial, unless otherwise indicated.

B. Foil-backed Detectable Type Tape: 3 inches (76 mm) wide, with minimum thickness of 5 mil (0.1 mm), unless otherwise required for proper detection.

C. Legend: Type of service, continuously repeated over full length of tape.

D. Color:
1. Tape for Buried Power Lines: Black text on red background.

2.04 WARNING SIGNS AND LABELS

A. Comply with ANSI Z535.2 or ANSI Z535.4 as applicable.

B. Warning Signs:
1. Materials:
   a. Indoor Dry, Clean Locations: Use factory pre-printed rigid plastic or self-adhesive vinyl signs.
   b. Outdoor Locations: Use factory pre-printed rigid aluminum signs.
2. Minimum Size: 7 by 10 inches (178 by 254 mm) unless otherwise indicated.

C. Warning Labels:
1. Materials: Use factory pre-printed or machine-printed self-adhesive polyester or self-adhesive vinyl labels; UV, chemical, water, heat, and abrasion resistant; produced using materials recognized to UL 969.
2. Machine-Printed Labels: Use thermal transfer process printing machines and accessories recommended by label manufacturer.
3. Minimum Size: 2 by 4 inches (51 mm by 102 mm) unless otherwise indicated.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Secure nameplates to exterior surfaces of enclosures using stainless steel screws and to interior surfaces using self-adhesive backing or epoxy cement.

C. Install underground warning tape above buried lines with one tape per trench at 3 inches (75 mm) below finished grade.

D. Secure rigid signs using stainless steel screws.

END OF SECTION