

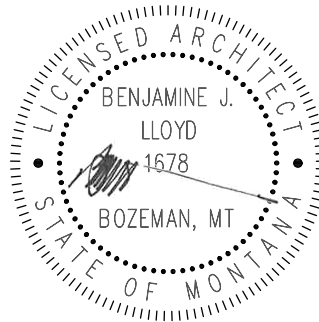
PROJECT MANUAL FOR:

Tietz Hall Cage Washer Replacement

MONTANA STATE UNIVERSITY
BOZEMAN, MONTANA

7/31/2023

PPA No. 22-0541



**MONTANA
STATE UNIVERSITY**

UNIVERSITY FACILITIES MANAGEMENT
BOZEMAN, MONTANA
PHONE: (406) 994-5413 FAX: (406) 994-5665

**Hennebery Eddy
Architects**



109 NORTH ROUSE
BOZEMAN, MONTANA
PHONE: (406)-585-1112

TABLE OF CONTENTS

BIDDING REQUIREMENTS

Permit Notice	
Invitation To Bid	
Instructions to Bidders	
Bid Proposal, Form 098	

CONTRACT DOCUMENTS

Included in this Project Manual:

State of Montana General Conditions	MSU Supplemental Conditions
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The following documents to be used for construction are not included in the printed project manual.

These MSU Forms can be downloaded from our website:

<http://www.montana.edu/pdc/docs/index.html> – or will be provided upon request.

Substitution Request, Form 99	Certificate of Substantial Completion, Form 107
Schedule of Values for Payment, Form 100	Construction Change Directive, Form 109
Periodic Estimate for Partial Payment, Form 101	Request for Information, Form 111
Acknowledgement of Subcontractors, Form 102	Performance Bond, Form 112
Consent of Surety to Final Payment, Form 103	Labor and Material Payment Bond, Form 113
Contract Change Order, Form 104	Certificate of Final Acceptance, Form 118
Contractor's Affidavit, Form 106	Buy Safe Montana Form

For most current Montana Prevailing Wage Rates applicable to this project download from this site: <http://erd.dli.mt.gov/labor-standards/state-prevailing-wage-rates>

TECHNICAL SPECIFICATIONS

Division 1 - General Requirements	
Summary	01 1000
Price and Payment Procedures	01 2000
Alternates	01 2300
Substitution Procedures.....	01 2500
Submittals.....	01 3000
Project Coordination	01 3100
Quality Requirements	01 4000
Temporary Facilities	01 5000
Product Requirements	01 6000
Executions.....	01 7300
Waste Management.....	01 7320
Warranties Bonds	01 7400
Project Closeout	01 7700
Operations & Maintenance Manuals	01 7823
Project Record Documents	01 7839
Demonstrations & Training	01 7900
Selective Demolition	02 4119
Division 5 - Metals	
Formed Metal Fabrications	05 5800

Division 7 - Thermal and Moisture Protection	
Modular Wall.....	07 4200
Division 8 - Openings	
Access Door	083100
Division 9 - Finishes	
Resinous Flooring.....	09 6723
High-Performance Coatings.....	09 9600
Division 21 - Fire Protection	
Fire Protection Systems.....	21 1313
Division 22 - Plumbing	
General Provisions for Plumbing.....	22 0000
Plumbing Piping Accessories.....	22 0517
Valves.....	22 0523
Supports, Anchors, and Bases	22 0529
Piping and Equipment Identification.....	22 0553
Plumbing Systems Insulation.....	22 0719
General Requirements for Pipe and Pipe Fittings	22 1100
Domestic Water Piping System.....	22 1116
Soil, Waste, and Drain Piping System.....	22 1316
Compressed Air Piping	22 6313
Division 23 - Heating Ventilating and Air Conditioning	
General Provisions for Mechanical Work	23 0000
Variable Frequency Drive Systems.....	23 0514
HVAC Piping Accessories.....	23 0517
Valves.....	23 0523
Supports, Anchors, and Bases	23 0529
Identification for HVAC Piping, Equipment and Ductwork	23 0553
Testing, Adjusting and Balancing.....	23 0593
Mechanical Systems Insulation.....	23 0713
Building Management and Control System	23 0900
General Requirements for Pipe and Pipe Fittings	23 1100
Steam and Condensate Piping	23 2213
Ductwork and Accessories.....	23 3113
Fans	23 3400
Division 26 - Electrical	
General Provisions for Electrical Work.....	26 0000
Power Conductors and Cables	26 0519
Hangers and Supports.....	26 0529
Raceways and Boxes	26 0533
Identification for Electrical Systems	26 0553
Wiring Devices.....	26 2726

OWNER FURNISHED EQUIPMENT (CAGE WASHER) DATA SHEETS

Cage washer description, plans, and utility requirements

CONSTRUCTION DRAWINGS

G0.1 GENERAL INFORMATION

A1.1 ARCHITECTURAL PLAN VIEWS

A1.2 ARCHITECTURAL SECTIONS AND ELEVATIONS

M0.1 : MECHANICAL LEGEND & SCHEDULES

M1.1 : MECHANICAL DEMOLITION PLANS

M2.1 : CONSTRUCTION HVAC PLANS

M3.1 : MECHANICAL PIPING PLANS

M3.2 : MECHANICAL HVAC PLANS

M4.1 : ROOF MECHANICAL PLAN

M5.1 : MECHANICAL DETAILS

M6.1 : EXISTING PRESSURE CASCADE

M6.2 : CONSTRUCTION PRESSURE CASCADE

M6.3 : FINAL PRESSURE CASCADE

M7.1 : TEMPERATURE CONTROLS

E1.0 : ELECTRICAL PLAN



UNIVERSITY FACILITIES MANAGEMENT

Sixth Avenue and Grant Street • P.O. Box 172760 • Bozeman, Montana
59717-2760 Phone: (406) 994-5413 • Fax: (406) 994-5665

PERMIT NOTICE

At the time of Bidding, the City of Bozeman, Building Inspection Division, has determined that this project does not require building permits as the work is considered Repair and Maintenance. However, an **Electrical Permit is required**. Should the scope of the project change in the future, building permits may be required.

Bidders are encouraged to contact the City of Bozeman, Building Inspection Division, for further information regarding permits.

**CITY OF BOZEMAN
BUILDING INSPECTION DIVISION
20 EAST OLIVE STREET
SUITE 208
BOZEMAN, MONTANA 59715
(406) 582-2375**

INVITATION TO BID

Sealed bids will be received until **2:00 PM** on **Tuesday, September 26, 2023**, and will be publicly opened and read aloud in the offices of **MSU University Facilities Management, Plew Building, 6th & Grant, Bozeman, Montana**, for: **Teitz Hall Cage Washer Replacement, PPA No. 22-0541**.

Bids shall be submitted on the form provided within the Contract Documents. Contract documents may be obtained at the offices of:

Montana State University
UNIVERSITY FACILITIES MANAGEMENT
Plew Building, 6th & Grant
PO Box 172760
Bozeman, Montana 59717-2760

On the web at:
<http://www.montana.edu/pdc/bids.html>

A PRE-BID WALK-THROUGH IS SCHEDULED FOR Tuesday, September 12, 2023, AT 2:30 PM PARTICIPANTS SHOULD MEET AT: TIETZ HALL. ATTENDANCE IS STRONGLY RECOMMENDED. Bidders should thoroughly review the contract documents before the pre-bid conference.

Bids must be accompanied by a bid security meeting the requirements of the State of Montana in the amount of 10% of the total bid. After award, the successful bidder must furnish an approved Performance Security and a Labor & Material Payment Security each in the amount of 100% of the contract for contracts equal to or greater than \$50,000.

No bidder may withdraw his bid for at least thirty (30) calendar days after the scheduled time for receipt of bids except as noted in the Instructions to Bidders.

The Owner reserves the right to reject any or all bids and to waive any and all irregularities or informalities and the right to determine what constitutes any and all irregularities or informalities.

Time of Completion

Bidder agrees to commence work immediately upon receipt of the Notice to Proceed and to substantially complete the project **within 180 consecutive days**.

The State of Montana makes reasonable accommodations for any known disability that may interfere with an applicant's ability to compete in the bidding and/or selection process. In order for the state to make such accommodations, applicants must make known any needed accommodation to the individual project managers or agency contacts listed in the contract documents.

State of Montana - Montana State University

INSTRUCTIONS TO BIDDERS

1. Table of Contents

Provided in the Printed Project Manual:

Invitation to Bid
Instruction to Bidders
Bid Proposal, Form 098
Sample Standard Form of Contract
State of Montana General Conditions
MSU Supplementary Conditions
Specifications
Drawings

Periodic Estimate for Partial Payment, Form 101
Acknowledgement of Subcontractors, Form 102
Consent of Surety to Final Payment, Form 103
Contract Change Order, Form 104
Contractor's Affidavit, Form 106
Certificate of Substantial Completion, Form 107
Construction Change Directive, Form 109
Request for Information, Form 111
Performance Bond, Form 112
Labor and Material Payment Bond, Form 113
Certificate of Final Acceptance, Form 118
Buy-Safe Montana Form

These additional forms can be found on our website or will be provided upon request:

<http://www.montana.edu/pdc/docs/index.html>

Substitution Request, Form 99
Schedule of Values, Form 100

For most current Montana Prevailing Wage Rates applicable to this project download from this site: <http://erd.dli.mt.gov/labor-standards/state-prevailing-wage-rates>

2. Viewing of Contract Documents

2.1. The Contract Documents may be viewed at the following locations:

Builders Exchange of Billings
2050 Broadwater STE A
Billings MT 59102
406/652-1311
bbx@billingsplanroom.com

NW MT - Flathead Builders
Exchange
2303 Hwy 2 E
Kalispell, MT 59901
406/755-5888
planex@kalcopy.com

Helena Plans Exchange
1530 Cedar Street Suite C
Helena MT 59601
406/457-2679
helenaplanex@helenacopycenter.com

Bozeman Builders Exchange
1105 Reeves RD W STE 800
Bozeman MT 59718
406/586-7653
exchange@bozemanplanroom.com

Great Falls Builders Exchange
202 2ND Avenue S
Great Falls MT 59401
406/453-2513
gfbe@greatfallsplans.com

Missoula Plans Exchange
201 N Russell ST
Missoula MT 59801
406/549-5002
mpe@vemcoinc.com

Butte Builders Exchange
4801 Hope Road
Butte MT 59701
406/782-5433
butteplans@gmail.com

3. Borrowing of Documents: Up to two hard copy sets may be obtained for General Contractors. Additionally, Contract Documents will be available electronically. If shipping of hard copies is required, it will be at the contractor's expense.

3.1. Contract Documents may be obtained at the office of:

**MONTANA STATE UNIVERSITY
UNIVERSITY FACILITIES MANAGEMENT
PLEW BUILDING 1st FLOOR
6TH AND GRANT
BOZEMAN, MONTANA 59717-2760
406/994-5413**

3.2. All borrowed Contract Documents shall be returned to University Facilities Management within ten (10) calendar days after the bid opening for the deposit refund (if deposit was required). However, if the Contract Documents are not in a condition where they can be reused by the

Owner to construct the project, the Owner may at its sole discretion may retain the deposit or levy costs to contractor in order to reproduce a replacement set.

4. Visits to Site

4.1. Prospective bidders are requested to contact the following for inspection of the site:

**Loras O'Toole, Project Manager
Montana State University
University Facilities Management
6th and Grant, PO Box 172760
Bozeman, Montana 59717-2760
Ph: 406/994-7092; Fax: 406/994-5665**

4.2. Failure to visit site will not relieve the Contractor of the conditions of the contract.

5. Requests for Substitution

5.1 Any requests for product substitutions must be submitted on the "Substitution Request" Form 099, to the Architect/Engineer at least ten (10) days prior to the date of the bid opening for consideration by the Architect/Engineer. Any request for substitution made after this time restriction, including those made after award during project construction may be rejected without consideration by either the Architect/Engineer or the Owner.

6. Bids/Proposals

6.1. The bidder shall submit his bid on the Bid Proposal Form furnished with the Contract Documents.

6.2. DO NOT send the Contract Documents with the Proposal. The Contract Documents shall be returned as noted in Article 3.2 of the Instructions to Bidders.

6.3. If the project is funded by any portion of federal funds, the following may apply: on Federally-funded projects, a "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion" form must be submitted with the bid proposal. If the debarment form is not included within the Construction Documents, federal funds (if included) do not require the form or are not included in the project and the debarment form is not required.

6.4. Proposals shall be in a sealed envelope and addressed to:

**STATE OF MONTANA, MONTANA STATE UNIVERSITY
UNIVERSITY FACILITIES MANAGEMENT
PLEW BUILDING 1ST FLOOR
6TH AND GRANT
PO BOX 172760, BOZEMAN, MONTANA 59717-2760**

6.5. The envelope shall state that it contains a "BID PROPOSAL" and indicate the following information:

Name of Project: **Teitz Hall Cage Washer Replacement**
Location: **Montana State University Bozeman Campus**
MSU PPA Project Number: **22-0541**
Name of Bidder: _____
Acknowledge Addendum Number: __, __, __, __

6.6. It is the bidder's responsibility to deliver or ensure delivery of the bid proposal to Montana State University, University Facilities Management. Proposals received after the scheduled closing time for bids by either the bidder, a delivery service (e.g. Federal Express, U.S. Postal Service, United Parcel Service, etc.), or the state's own mail delivery system, will be rejected. Proposals entitled for consideration must be time-stamped in the Owner's office prior to the closing time for receipt of bids. The official time clock for receipt of bids and fax modifications is the Owner's time and date stamp clock located in the reception area of the Owner's office. No other clocks, calendars or timepieces are recognized. All bidders are responsible to ensure all bids and fax modifications are received in the Owner's office prior to the scheduled closing time.

- 6.7. If requested on the Bid Proposal, any person making a bid to perform the Work shall, as a requirement of a responsible bid, set forth the name of each subcontractor specified in the "List of Subcontractors" which is part of the bid proposal. The bidder shall list only one subcontractor for each such portion or work listed. The bidder whose bid is accepted shall not:
 - 6.7.1. Substitute any other subcontractor in place of the subcontractor listed in the original bid, except by specific consent of the Owner. The Owner, at its sole discretion, may grant substitution with consent of the originally listed subcontractor, or in consideration of other factor(s) involved if deemed relevant to the successful performance of the Contract.
 - 6.7.2. Permit any such subcontract to be voluntarily assigned, transferred or allow it to be performed by any party other than the subcontractor listed in the original bid without the consent of the Owner.
- 6.8. Bid Proposals entitled to consideration shall be made in accordance with the following instructions:
 - 6.8.1. Made upon form provided;
 - 6.8.2. All blank spaces properly filled;
 - 6.8.3. All numbers stated in both writing and in figures;
 - 6.8.4. Shall contain no additions, conditional or alternate bids, erasures or other irregularities;
 - 6.8.5. Shall acknowledge receipt of all addenda issued.
- 6.9. Bid Proposals entitled to consideration shall be signed by the proper representative of the firm submitting the proposal as follows:
 - 6.9.1. The principal of a single owner firm;
 - 6.9.2. A principal of a partnership firm;
 - 6.9.3. An officer of an incorporated firm, or an agent whose signature is accompanied by a certified copy of the resolution of the Board of Directors authorizing that agent to sign; or,
 - 6.9.4. Other persons signing for a single-owner firm or a partnership shall attach a power-of-attorney evidencing his authority to sign for that firm.
- 6.10. Unit Prices: When a Bid Proposal Form contains unit prices, any errors discovered in the extension of those unit prices will be corrected by the Owner using the unit price figures. The adjusted extended amount will then be used to determine the correct total bid. Only after the amounts have been checked and adjusted, if necessary, will the valid low bid be determined.
- 6.11. Estimated Quantities: All estimated quantities stipulated in the Bid Proposal and other Contract Documents are approximate and are to be used only as a basis for estimating the probable cost of the work and for the purpose of comparing proposals submitted for the work. It is understood and agreed that the actual amounts of work done, and materials furnished under unit price items may vary from such estimated quantities. The actual quantities will depend on the conditions encountered at the time the work is performed.
- 6.12. Any bidder may modify his bid by fax communication only.
 - 6.12.1 It is the bidder's responsibility to ensure that the entire modification is received at the bid opening location prior to the scheduled closing time for receipt of bids. The modification shall not reveal the bid price but shall only provide the ADDITION or SUBTRACTION from the original proposal.
 - 6.12.2 The Owner is not responsible for the performance of the facsimile/printer machine, maintaining adequate paper levels, toner levels, the telephone connection, quality of the facsimile, or any other factors affecting receipt of the fax. Unreadable or difficult-to-read facsimiles may be rejected at the sole discretion of the Owner.
 - 6.12.3 Changes in the listed subcontractors, if any, shall also be provided.
 - 6.12.4 Bid modifications must be verified by hard copy provided to the Owner within two (2) business days after the bid opening.
 - 6.12.5 Bid modifications shall be directed to fax phone (406) 994-5665.
 - 6.12.6 All facsimiles shall be date and time stamped on the same time-stamp clock in the Owner's office that is used for receipt of bids in order to be considered valid. The Owner may also use the date and time on the automatically-generated email notification of facsimile receipt as generated by the State's system. Any date and time indicated at the

top of the facsimile on either the bidder's or the Owner's facsimile/printer machine will not be used in determining time of arrival of the modification.

- 6.13. The Owner reserves the sole right to reject any or all bids and to waive any irregularities or informalities. The Owner also reserves the sole right to determine what constitutes irregularities or informalities and/or what is material and/or immaterial to the bids received.

7. Bid Security

- 7.1. IF THE PROJECT COST IS LESS THAN \$25,000, AT ITS SOLE DISCRETION THE STATE OF MONTANA MAY OR MAY NOT REQUIRE BID SECURITY (18-2-302 MCA).
- 7.2. All proposals shall be accompanied by a bid security in the amount of 10% of the bid price, as evidence of good faith (18-2-302 MCA). **(MSU does not waive bid security.)**
- 7.3. Bid security shall be in the form of lawful moneys of the United States, cashier's check, certified check, bank money order or bank draft, bid bond or bonds payable to the State of Montana (18-2-302 MCA).
- 7.4. If the bidder, to whom a contract is awarded, fails to enter into and execute the proposed contract within fifteen (15) calendar days of award, the bidder shall forfeit the bid security (18-1-204 MCA).
- 7.5. The bid security of unsuccessful bidders will be returned when the contract has been awarded to the successful bidder or when all bids have been rejected (18-1-205 MCA).
- 7.6. Execution of and entering into a contract includes providing all necessary insurance certificates, bonds, signed contract and current copy of the construction contractor registration certificate.
- 7.7. **NOTE: PER STATE POLICY, IF CASH, CHECK, MONEY ORDER, OR BANK DRAFT ARE PROVIDED AS BID SECURITY, IT WILL BE DEPOSITED IN THE TREASURY. UNSUCCESSFUL BIDDERS WILL HAVE THEIR SECURITY RETURNED UPON CONTRACT AWARD. THE SUCCESSFUL BIDDER'S SECURITY MAY BE RETURNED UPON ISSUANCE OF NOTICE TO PROCEED.**

8. Withdrawal of Bids

- 8.1. Any bidder may withdraw his bid proposal at any time prior to the scheduled closing time for the receipt of bids.
- 8.2. Once the closing time for the receipt of bids is reached, a bid may not be withdrawn for a period of thirty (30) calendar days.

9. Interpretation of Contract Documents

- 9.1. Bidders shall promptly notify the Architect/Engineer of any ambiguity, inconsistency, or error which they may discover upon examination of the Contract Documents or of the site and local conditions.
- 9.2. Bidders requiring clarification or interpretation of the Contract Documents shall request, in writing, clarification from the Architect/Engineer at least ten (10) calendar days prior to the date set for receipt of bids.
- 9.3. Any interpretations, corrections, or change in the Contract Documents prior to the bid opening will be made by written addendum issued by the Architect/Engineer. The Architect/Engineer will endeavor to notify all plan holders of any addenda issued but it shall be the responsibility of the individual bidders to insure they have received all addenda prior to the submission of their bid.
- 9.4. All written addenda issued by the Architect/Engineer will become part of the Contract Documents and all bidders shall be bound by such addenda whether or not received and/or acknowledged by the bidder. No oral or telephone modifications of the Contract Documents will be considered or allowed.

10. Award of Bids

- 10.1. All bids received by the stated hour will be opened and publicly read aloud.
- 10.2. The Owner reserves the right to reject any and all bids and to waive any informality or irregularity in any bid received. Owner reserves the right to determine what constitutes material and/or immaterial informalities and/or irregularities.
- 10.3. The low bid shall be determined on the basis of the lowest Base Bid or the lowest combination of Base Bid and Alternate Bids, accepted in consecutive order.
- 10.4. The Owner shall award such contract to the lowest responsible bidder (18-1-102 MCA).
 - 10.4.1. The Owner may make such investigations as it deems necessary to determine whether or not any or all bidders are responsible.
 - 10.4.2. The term "responsible" does not refer to pecuniary ability only, nor the ability to tender sufficient performance and payment bonds.
 - 10.4.3. The term "responsible" includes, but is not limited to:
 - 10.4.3.1. Having adequate financial resources to perform the contract or the ability to obtain them;
 - 10.4.3.2. Being able to comply with the required delivery, duration, and performance schedule;
 - 10.4.3.3. Having a satisfactory record of integrity and business ethics;
 - 10.4.3.4. Having the necessary organization, experience, accounting, and operational controls;
 - 10.4.3.5. Having the necessary production, construction, technical equipment, and facilities; and,
 - 10.4.3.6. Having the technical skill, ability, capacity, integrity, performance, experience, lack of claims and disputes, lack of actions on bonds, lack of mediations, arbitrations and/or lawsuits related to construction work or performance, and such like.
 - 10.4.4. Bidders shall furnish to the Owner all information and data for this purpose as the Owner may request.
 - 10.4.5. The Owner reserves the right to reject any bid if the investigation or evidence of any Bidder fails to satisfy the Owner that such Bidder is properly and adequately qualified to suitably perform and satisfactorily execute the obligations of the Contract and Work defined in the Contract Documents.
- 10.5. The Owner shall award such contract to the lowest responsible bidder without regard to residency except on a reciprocal basis: a resident bidder will be allowed a preference on a contract against the bid of any non-resident bidder from any state or country that enforces a preference for resident bidders. The preference given to resident bidders of the State of Montana must be equal to the preference given in the other state or country (18-1-102, MCA). This does not apply when prohibited by Federal requirements.
- 10.6. The State of Montana may negotiate deductive changes, not to exceed 7% of the total cost of the project, with the lowest responsible bidder when the lowest responsible bids causes the project cost to exceed the appropriation; or with the lowest responsible bidders if multiple contracts will be awarded on the projects when the total of the lowest responsible bids causes the project cost to exceed the appropriation. A bidder is not required to negotiate his bid but is required to honor his bid for the time specified in the bidding documents. The Owner may terminate negotiations at any time (18-2-105(7) MCA).

11. Contract

- 11.1. The sample Standard Form of Contract between Contractor and Owner, as issued by the Owner, will be used as the contracting instrument and is bound within the Contract Documents.
- 11.2. The form shall be signed by a proper representative of the bidder as defined above in these instructions.
- 11.3. The contractor shall also complete and return a federal form W-9 with the Contract.

12. Performance, Labor and Material Payment Security

- 12.1. IF THE PROJECT COST IS LESS THAN \$25,000, AT ITS SOLE DISCRETION THE STATE OF MONTANA MAY OR MAY NOT REQUIRE A PERFORMANCE OR LABOR AND MATERIAL PAYMENT SECURITY (18-2-201 MCA). **(MSU REQUIRES BONDS ON ALL PROJECTS ABOVE \$50,000.)**
- 12.2. THE CONTRACTOR SHALL PROVIDE BOTH SECURITIES FOR THIS PROJECT AS SPECIFIED BELOW, UNLESS SPECIFICALLY DIRECTED THAT THIS REQUIREMENT HAS BEEN WAIVED ELSEWHERE IN THESE DOCUMENTS.
- 12.3. The Owner shall require the successful bidder to furnish a Performance Bond in the amount of 100% of the contract price as security for the faithful performance of his contract (18-2-201, MCA).
- 12.4. The Owner shall require the successful bidder to furnish a Labor and Material Payment Bond in the amount of 100% of the contract price as security for the payment of all persons performing labor and furnishing materials in connection therewith (18-2-201 MCA).
- 12.5. The bonds shall be executed on forms furnished by the Owner. No other forms will be acceptable.
- 12.6. The bonds shall be signed in compliance with State statutes (33-17-111 MCA).
- 12.7. Bonds shall be secured from a State licensed bonding company.
- 12.8. Power of Attorney
 - 12.8.1. Attorneys-in-fact who sign contract bonds must file with each bond a certified and effectively dated copy of their power of attorney;
 - 12.8.2. One original copy shall be furnished with each set of bonds.
 - 12.8.3. Others furnished with a set of bonds may be copies of that original.
13. Notice To Proceed
 - 13.1. The successful bidder who is awarded the contract for construction will not be issued a Notice to Proceed until there is a signed Contract, the specified insurance certificates and a copy of the bidder's current Construction Contractor Registration Certificate in the Owner's possession. All items are required within fifteen (15) calendar days of contract award made by the Owner.
14. Laws and Regulations
 - 14.1. The bidders' attention is directed to the fact that all applicable federal and state laws, municipal ordinances, and the rules and regulations of all authorities having jurisdiction over the project shall apply to the contract throughout and will be deemed to be included in this contract as if bound herein in full.
15. Payments
 - 15.1. NOTICE OF APPROVAL OF PAYMENT REQUEST PROVISION. Per Title 28, Chapter 2, Part 21, this contract allows the Owner to change the number of days to approve a Contractor's payment request. This contract allows the Owner to approve the Contractor's payment request within thirty-five (35) calendar days after it is received by the Owner without being subject to the accrual of interest.
16. Buy Safe Montana Provisions
 - 16.1. The successful bidder who is awarded the contract for construction shall provide their incident rate, experience modification ratio (EMR) and loss ratio via the Buy-Safe Montana form with the Award documents.
17. Time of Completion
 - 17.1. Bidder agrees to commence work immediately upon receipt of the Notice to Proceed and to substantially complete the project **within 180 consecutive days**.

17.2. If liquidated damages are assessed for exceeding the completion date, they shall accrue at the rate of **ONE HUNDRED AND NO/100 (\$100.00) DOLLARS** per calendar day. Liquidated damages charges will be deducted from the amount due the Contractor

~END OF INSTRUCTIONS~



BID PROPOSAL
TIETZ HALL CAGE WASHER REPLACEMENT
PPA No. 22-0541

TO:
State of Montana, Montana State University
University Facilities Management
Attn: Contract Administrator
Plew Building, 6th & Grant,
PO Box 172760
Bozeman, Montana 59717-2760

Prospective Bidders:

The undersigned, having familiarized themselves with the Contract Documents, site, location, and conditions of the Work as prepared by Hennebery Eddy Architects (109 N. Rouse Ave. Bozeman, MT 406-585-1112) by submission of this Bid Proposal, hereby agrees to provide all materials, systems, equipment and labor necessary to complete the Work for the total sum as follows:

BASE BID:

_____ and _____ /100 DOLLARS
(ALPHA notation) \$ _____ (NUMERIC notation)

ALTERNATE NO. 1:
ADD STAINLESS STEEL WALL PANEL ENCLOSURE SYSTEM AND ALL PAINTING INSIDE PANEL ENCLOSURE (PAINTING IN WASHER AREA IN BASE BID). RELOCATE LIGHT AND ADD LIGHT SWITCH, INSTALL ADDITIONAL FIRE SPRINKLER, INSTALL TRANSFER GRILLE INTO THE PANEL ENCLOSURE SYSTEM, AND ANY OTHER CHANGES AS INDICATED ON THE PLANS.

THE BIDDER AGREES TO ADD THE SPECIFIED SCOPE OF WORK FOR THE TOTAL SUM OF:

_____ and _____ /100 DOLLARS
(ALPHA notation) \$ _____ (NUMERIC notation)

This bidder acknowledges receipt of the following addenda:

ADDENDUM No.: _____ Dated: _____
ADDENDUM No.: _____ Dated: _____
ADDENDUM No.: _____ Dated: _____

By signing below, the bidder agrees to all terms specified and AGREES TO fulfill the requirements of the CONTRACT in strict accordance with the bidding documents.

Company Name: _____

Business Address: _____

Construction Contractor
Registration No.: _____

Phone No.: _____

Fax No.: _____

Email: _____

Date: _____

Bid Proposals entitled to consideration shall be signed by the proper representative of the firm submitting the proposal as follows (Initial which requirement you meet):

- The principal of a single owner firm;
- A principal of a partnership firm;
- An officer of an incorporated firm, or an agent whose signature is accompanied by a certified copy of the resolution of the Board of Directors authorizing that agent to sign; or (attach a copy of the resolution),
- Other persons signing for a single-owner firm or a partnership shall attach a power-of-attorney evidencing his authority to sign for that firm.

Signature: _____

Print Name: _____

Title: _____



**GENERAL CONDITIONS
OF THE CONTRACT FOR CONSTRUCTION**

State of Montana Version
(Form Revision Date: 5/2021)

FRONT PAGE HIGHLIGHTS

Note: This list of items is not an exhaustive or all-inclusive list of the contractor's responsibilities for the Project but is provided solely for convenience and reference.

ITEM	REFERENCE	GENERAL CONDITIONS
Prevailing Wage Rates	Article 3.4.4	The Commissioner of The Montana Department of Labor and Industry (DOLI) has established the standard prevailing rate of wages in accordance with 18-2-401 and 18-2-402, MCA.
Warranty	Article 3.5.2	The warranty period shall be defined as commencing with Substantial Completion (or with each Substantial Completion if there is more than one) of the Project, or any portion thereof, and continuing for one (1) calendar year from the date of Final Acceptance of the entire project.
Schedule	Article 3.10.1	The Contractor's schedule shall be in the "Critical Path Method" and shall be in a form that is acceptable to the Owner and meet all the conditions of 3.10.
Time Limit on Claims	Article 4.3.1.1	Claims by either party must be initiated within 21 calendar days after occurrence of the event giving rise to such claim.
Weather Delays	Article 4.3.5.2	If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated, and had an adverse effect on the current critical- path scheduled construction activities.
Waiver of Consequential Damages	Article 4.3.6	The Contractor and Owner waive Claims against each other for consequential damages arising out of or relating to this Contract.
Mediation & Arbitration	Article 4.5 & 4.6	The parties shall endeavor to resolve their Claims by mediation unless the parties mutually agree otherwise. Claims not resolved by mediation shall be decided by arbitration.
Changes	Article 7	Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive, or order for a minor change in the Work subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents.
Change Order Allowable Costs	Article 7.2.2.1	As described with a 5% allowance for overhead and a 10% allowance for profit.
Time	Article 8	Time is of the essence in performance, coordination, and completion of the Work contemplated herein.
Liquidated Damages	Article 8.1.6	The Contractor and his surety shall be liable for and shall pay to the Owner the sums stipulated as liquidated damages for each calendar day of delay until the Work is substantially complete.
Contract Duration/Milestones/Phases	Article 8.1.9	All Work shall reach Substantial Completion by the date(s) listed or within the consecutive calendar days indication after the start date on the written Notice To Proceed.
Applications for Payment	Article 9.3.2	The Owner has thirty-five (35) calendar days after receipt for approval of the Contractor's Pay Request without being subject to the accrual of interest.
Retainage	Article 9.3.7	Until the Work is complete, the Owner will pay 95% of the amount due the Contractor on account of progress payments. If the Work and its progress are not in accordance with all or any part, piece, or portion of the Contract Documents, the Owner may, at its sole discretion and without claim by the Contractor, increase the amount held as retainage to whatever level deemed necessary to effectuate performance and progress of the Work.
Safety & Protection	Article 10	The Contractor shall be solely responsible for initiating, maintaining and supervising all safety, safety precautions, and safety programs in connection with the performance of the Contract.
Indemnification and Insurance Requirements	Article 11	The Contractor shall indemnify the Owner against the Contractor's negligence. The Contractor shall least carry Workers' Comp, General Liability, Automobile/Equipment, and Property (all-risk) Insurance Coverages as identified. State of Montana shall be listed as an additional insured with copy of ENDORSEMENT provided along with certificates of insurance. No waivers of subrogation shall be accepted.
Performance & Payment Bonds	Article 11.7	The Contract shall furnish a Performance Bond in the amount of 100% of the contract price as security for the faithful performance of his contract. The Contractor shall also furnish a Labor and Material Payment Bond in the amount of 100% of the contract price as security for the payment of all persons performing labor and furnishing materials in connection therewith.
Payroll & Basic Records	Article 13.8	Payrolls and basic records pertaining to the project shall be kept on a generally recognized accounting basis and shall be available to the Owner, Legislative Auditor, the Legislative Fiscal Analyst or his authorized representative at mutually convenient times. Accounting records shall be kept by the Contractor for a period of three years after the date of the Owner's Final Acceptance of the Project.

GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION

(Form Revision Date: MSU 5/2021)

ARTICLE 1 – GENERAL PROVISIONS

1.1. BASIC DEFINITIONS

1.1.1. **CONTRACT DOCUMENTS.** The Contract Documents consist of the Contract between Owner and Contractor (hereinafter the “Contract”), Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of the Contract, other documents listed in the Contract and Modifications issued after execution of the Contract. A Modification is: (1) a written amendment to the Contract signed by both parties; (2) a Change Order; (3) a Construction Change Directive; or, (4) a written order for a minor change in the Work issued by the Architect/Engineer. The Contract Documents shall include the bidding documents and any alterations made thereto by addenda. In the event of a conflict, discrepancy, contradiction, or inconsistency within the Contract Documents and for the resolution of same, the following order of hierarchy and control shall apply and prevail:

1) Contract; 2) Addenda; 3) Supplementary General Conditions; 4) General Conditions; 5) Specifications; 6) Drawings; 7) Instructions to Bidders; 8) Invitation To Bid; 9) Sample Forms.

1.1.1.1. If a conflict, discrepancy, contradiction, or inconsistency occurs within or between the Specifications and the Drawings, resolution shall be controlled by the following:

1.1.1.1.1. As between figures, dimensions, or numbers given on drawings and any scaled measurements, the figures, dimensions, or numbers shall govern;

1.1.1.1.2. As between large scale drawings and small scale drawings, the larger scale drawings shall govern;

1.1.1.1.3. As between the technical specifications and drawings; the technical specifications shall govern.

1.1.1.1.4. Shop Drawings and Submittals: Shop drawings and other submittals from the Contractor, subcontractors, or suppliers do not constitute a part of the Contract Documents.

1.1.1.2. The Contractor acknowledges, understands and agrees that the Contract Documents cannot be changed except as provided herein by the terms of the Contract. No act(s), action(s), omission(s), or course of dealing(s) by the Owner or Architect/Engineer with the Contractor shall alter the requirements of the Contract Documents and that alteration can be accomplished only through a written Modification process defined herein.

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

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

1.1.4. **THE CONTRACT.** The entire Contract for Construction is formed by the Contract Documents. The Contract represents the entire, complete, and integrated agreement between the Owner and Contractor.

hereto and supersedes prior negotiations, representations or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind between: (1) the Architect/Engineer and Contractor; (2) the Owner and any Subcontractor, Sub-subcontractor, or Supplier; (3) the Owner and Architect/Engineer; or, (4) between any persons or entities other than the Owner and Contractor. However, the Architect/Engineer shall at all times be permitted and entitled to performance and enforcement of its obligations under the Contract intended to facilitate performance of the Architect/Engineer's duties.

- 1.1.5. THE WORK. The term "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment and services provided or to be provided by the Contractor to completely fulfill the Contract and the Contractor's obligations. The Work may constitute the whole or a part of the Project.
- 1.1.6. THE PROJECT. The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by the Owner or by separate contractors.
- 1.1.7. TIME. Time is of the essence in performance, coordination, and completion of the Work contemplated herein. The Owner may suffer damages if the Work is not completed as specified herein. When any duration or time period is referred to in the Contract Documents by days, the first day of a duration or time period shall be determined as the day following the current day of any event or notice starting a specified duration. All durations in the Contract Documents are calendar days unless specifically stated otherwise.

1.2. CORRELATION, INTER-RELATIONSHIP, AND INTENT OF THE CONTRACT DOCUMENTS

- 1.2.1. The intent of the Contract Documents is to include all items and all effort necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary and inter-related, and what is required by one shall be as binding as if required by all. Performance by the Contractor shall be required to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.
- 1.2.2. Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade. It is the Contractor's responsibility to control the Work under the Contract.
- 1.2.3. Unless otherwise stated in the Contract Documents, words which have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

1.3. CAPITALIZATION

- 1.3.1. Terms capitalized in these General Conditions include those which are: (1) specifically defined; and, (2) the titles of numbered articles and identified references to Paragraphs, Subparagraphs and Clauses in the document.

1.4. INTERPRETATION

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

1.5. EXECUTION OF THE CONTRACT AND CONTRACT DOCUMENTS

- 1.5.1. The Contract shall be signed by the Owner and Contractor. Execution of the Contract by the Contractor constitutes the complete and irrevocable binding of the Contractor and his Surety to the Owner for complete performance of the Work and fulfillment of all obligations. By execution of the Contract, the Contractor acknowledges that it has reviewed and familiarized itself with all aspects of the Contract Documents and agrees to be bound by the terms and conditions contained therein.

- 1.5.2. Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed, and correlated personal observations with requirements of the Contract Documents.
- 1.5.3. The Contractor acknowledges that it has taken all reasonable actions necessary to ascertain the nature and location of the work, and that it has investigated and satisfied itself as to the general and local conditions which can affect the work or its cost, including but not limited to: (1) conditions bearing upon transportation, disposal, handling, and storage of materials; (2) the availability of labor, water, gas, electric power, phone service, and roads; (3) uncertainties of weather, river stages, tides, or similar physical conditions at the site; (4) the conformation, topography, and conditions of the ground; and, (5) the character of equipment and facilities needed for performance of the Work. The Contractor also 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 site, including all exploratory geotechnical work done by the Owner, as well as from the drawings and specifications made a part of this contract. Any failure of the Contractor to take the action described and acknowledged in this paragraph will not relieve the Contractor from responsibility for properly ascertaining and estimating the difficulty and cost of successfully performing the Work or for proceeding to successfully perform the Work without additional expense to the Owner.
- 1.5.4. The Owner assumes no responsibility for any conclusions or interpretations made by the Contractor based on the information made available by the Owner, nor does the Owner assume responsibility for any understanding reached or representation made by any of its officers, agents, or employees concerning conditions which can affect the Work unless that understanding or representation is expressly stated in the Contract Documents.
 - 1.5.4.1. Performance of any portion of the Work beyond that required for complying with the specifications and all other requirements of the Contract, shall be deemed to be for the convenience of the Contractor and shall be at the Contractor's sole expense.
 - 1.5.4.2. There shall be no increase in the contract price or time allowed for performance which is for the convenience of the Contractor.

1.6. OWNERSHIP AND USE OF DRAWINGS, SPECIFICATIONS, AND OTHER INSTRUMENTS OF SERVICE

- 1.6.1. The Drawings, Specifications and other documents, including those in electronic form, prepared by the Architect/Engineer and the Architect/Engineer's consultants are Instruments of Service through which the Work to be executed by the Contractor is described. The Contractor may retain one record set. Neither the Contractor nor any Subcontractor, Sub-subcontractor or material or equipment supplier shall own or claim a copyright in the Drawings, Specifications and other documents prepared by the Architect/Engineer or the Architect/Engineer's consultants. Unless otherwise indicated, the Architect/Engineer and the Architect/Engineer's consultants shall be deemed the authors of them and will retain all common law, statutory and other reserved rights, in addition to the copyrights except as defined in the Owner's Contract with the Architect/Engineer. All copies of Instruments of Service, except the Contractor's record set, shall be returned or suitably accounted for to the Architect/Engineer upon completion of the Work. The Drawings, Specifications and other documents prepared by the Architect/Engineer and the Architect/Engineer's consultants, and copies thereof furnished to the Contractor, are for use solely with respect to this Project. They are not to be used by the Contractor or any Subcontractor, Sub-subcontractor 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 the Owner, Architect/Engineer, and the Architect/Engineer's consultants. The Contractor, Subcontractors, Sub-subcontractors and material or equipment suppliers are authorized to use and reproduce applicable portions of the Drawings, Specifications and other documents prepared by the Architect/Engineer and the Architect/Engineer's consultants appropriate to and for use in the execution of their Work under the Contract Documents. All copies made under this authorization shall bear the statutory copyright notice, if any, shown on the Drawings Specifications and other documents prepared by the Architect/Engineer and the Architect/Engineer's consultants. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with this Project is not to be construed as publication in derogation of the Architect/Engineer's or Architect/Engineer's consultants' copyrights or other reserved rights.

- 1.6.2. Owner's Disclaimer of Warranty: The Owner has requested the Architect/Engineer prepare the Contract Documents for the Project which are adequate for bidding and constructing the Project. However, the Owner makes no representation, guarantee, or warranty of any nature whatsoever to the Contractor concerning such documents. The Contractor hereby acknowledges and represents that it has not, does not, and will not rely upon any such representation, guarantee, or warranty concerning the Contract Documents as no such representation, guarantee, or warranty have been or are hereby made.

ARTICLE 2 – THE OWNER

2.1. THE STATE OF MONTANA

- 2.1.1. The Owner is the State of Montana and is the sole entity to be identified as Owner in the Contract and as referred to throughout the Contract Documents as if singular in number.
- 2.1.2. Except as otherwise provided in Subparagraph 4.2.1, the Architect/Engineer does not have authority to bind the Owner. The observations and participations of the Owner or its authorized representative do not alleviate any responsibility on the part of the Contractor. The Owner reserves the right to observe the work and make comment. Any action or lack of action by the Owner shall not be construed as approval of the Contractor's performance.
- 2.1.3. The Owner reserves the right to require the Contractor, all sub-contractors and material suppliers to provide lien releases at any time. The Owner reserves the right to withhold progress payments until such lien releases are received for all work for which prior progress payments have been made. Upon the Owner's demand for lien releases (either verbally or written), the Contractor, all sub-contractors and material suppliers shall provide such releases with every subsequent application for payment through Final Acceptance of the Project.
- 2.1.4. Except for permits and fees, including those required under Subparagraph 3.7.1, which are the responsibility of the Contractor under the Contract Documents, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities.
- 2.1.5. Information or services required of the Owner by the Contract Documents shall be furnished by the Owner with reasonable promptness. Any other information or services relevant to the Contractor's performance of the Work under the Owner's control shall be furnished by the Owner after receipt from the Contractor of a written request for such information or services.
- 2.1.6. Unless otherwise provided in the Contract Documents, the Contractor will be furnished, free of charge, such copies of Drawings and Specifications as are reasonably necessary for execution of the Work.

2.2. OWNER'S RIGHT TO STOP WORK

- 2.2.1. If the Contractor fails to correct Work which is not in accordance with the requirements of the Contract Documents as required by Paragraph 12.2 or persistently fails to carry out Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated. However, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Subparagraph 6.1.3. The issuance of a stop work order by the Owner shall not give rise to a claim by the Contractor or any subcontractor for additional cost, time, or other adjustment.

2.3. OWNER'S RIGHT TO CARRY OUT THE WORK

- 2.3.1. If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a seven-day period after receipt of written notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may after such seven-day period give the Contractor a second written notice to correct such deficiencies within a three-day period. If the Contractor within such three-day period after receipt of such second notice fails to commence and continue to correct any deficiencies, the Owner may, without prejudice to other remedies the Owner may have, correct such deficiencies. In such case an appropriate Change Order shall be

issued deducting from payments then or thereafter due the Contractor the reasonable cost of correcting such deficiencies, including Owner's expenses and increased costs, and compensation for the Architect/Engineer's additional services made necessary by such default, neglect, or failure. If payments then or thereafter due the Contractor are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner.

2.4. OWNER'S RIGHT TO PERSONNEL

- 2.4.1. The Owner reserves the right to have the Contractor and/or subcontractors remove person(s) and/or personnel from any and all work on the project with cause but without cost to the Owner. Such requests from the Owner may be made verbally or in writing and may be done directly with the Contractor or indirectly through the Architect/Engineer. Cause may be, but not limited to, any of the following: incompetence, poor workmanship, poor scheduling abilities, poor coordination, disruption to the facility or others, poor management, causes delay or delays, disruption of the Project, will not strictly adhere to facility procedures and Project requirements either knowingly or unknowingly, insubordination, drug/alcohol use, possession of contraband, belligerent acts or actions, etc. The Contractor shall provide replacement person(s) and/or personnel acceptable to the Owner at no cost to the Owner.
- 2.4.2. Any issue or circumstance relating to or resulting out of this clause shall not be construed or interpreted to be interference with or impacting upon the Contractor's responsibilities and liabilities under the Contract Documents.
- 2.4.3. Person(s) and/or personnel who do not perform in accordance with the Contract Documents, shall be deemed to have provided the Owner with cause to have such persons removed from any and all involvement in the Work.
- 2.4.4. The Contractor agrees to indemnify and hold harmless the Owner from any and all causes of action, demands, claims, damages, awards, attorneys' fees, and other costs brought against the Owner and/or Architect/Engineer by any and all person(s) or personnel as a result of actions under this clause.

ARTICLE 3 – THE CONTRACTOR

3.1. GENERAL

- 3.1.1. The Contractor is the person or entity identified as such in the Contract and is referred to throughout the Contract Documents as if singular in number. The term "Contractor" means the Contractor or the Contractor's authorized representative.
- 3.1.2. Construction Contractor Registration: The Contractor is required to be registered with the Department of Labor and Industry under 39-9-201 and 39-9-204 MCA prior to the Contract being executed by the Owner. A bidder must demonstrate that it has registered or promises that it will register immediately upon notice of award and prior to the commencement of any work. If the prevailing bidder cannot or does not register in time for the Owner to execute the Contract within fifteen (15) days of the date on the notice of award, the Owner may award, at its sole discretion, to the next lowest responsible bidder who meets this requirement. The Owner will not execute a contract for construction nor issue a Notice to Proceed to a Contractor who is not registered per 39-9-401(a) MCA. It is solely the Contractor's responsibility to ensure that all Subcontractors are registered in accordance with Title 39, Chapter 9, MCA.
- 3.1.3. The Owner's engagement of the Contractor is based upon the Contractor's representations by submission of a bid to the Owner that it:
 - 3.1.3.1. has the requisite skills, judgment, capacity, expertise, and financial ability to perform the Work;
 - 3.1.3.2. is experienced in the type of labor and services the Owner is engaging the Contractor to perform;
 - 3.1.3.3. is authorized, licensed and registered to perform the type of labor and services for which it is being engaged in the State and locality in which the Project is located;

- 3.1.3.4. is qualified, willing and able to perform the labor and services for the Project in the manner and scope defined in the Contract Documents; and,
- 3.1.3.5. has the expertise and ability to provide labor and services that will meet the Owner's objectives, intent and requirements, and will comply with the requirements of all governmental, public, and quasi-public authorities and agencies having or asserting jurisdiction over the Project.
- 3.1.4. The Contractor shall perform the Work in accordance with the Contract Documents.
- 3.1.5. The Contractor shall not be relieved of obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Architect/Engineer in the Architect/Engineer's administration of the Contract, or by tests, inspections or approvals required or performed by persons other than the Contractor.
- 3.1.6. Quality Control (i.e. ensuring compliance with the Contract Documents) and Quality Assurance (i.e. confirming compliance with the Contract Documents) are the responsibility of the Contractor. Testing, observations, and/or inspections performed or provided by the Owner are solely for the Owner's own purposes and are for the benefit of the Owner. The Owner is not liable or responsible in any form or fashion to the Contractor regarding quality assurance or extent of such assurances. The Contractor shall not, under any circumstances, rely upon the Owner's testing or inspections as a substitute or in lieu of its own Quality Control or Assurance programs.
- 3.1.7. Buy-Safe Montana Provision: The Owner shall review the Buy-Safe Montana Form provided by the Bidder under Articles 16 of the Instructions to Bidders. To promote a safe work environment, the Owner encourages an incidence rate less than the latest average for non-residential building construction for Montana as established by the federal Bureau of Labor Statistics for the prior year; an experience modification rating (EMR) less than 1.0; and a loss ratio of less than 100%. The Contractor with a greater-than-average incidence rate, an EMR greater than 1.0, and a loss ratio of more than 100% shall schedule and obtain a Comprehensive Safety Consultation from the Montana Department of Labor & Industry, Employment Relations Division, Safety Bureau before the Owner grants Substantial Completion of the Work. For assistance in obtaining the Comprehensive Safety Consultation, visit <http://erd.dli.mt.gov/safety-health/onsite-consultation>.

3.2. REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

- 3.2.1. Since the Contract Documents are complementary and inter-related, before starting each portion of the Work, the Contractor shall carefully study and compare the various Drawings and other Contract Documents relative to that portion of the Work, shall take field measurements of any existing conditions related to that portion of the Work and shall observe any conditions affecting the Work. These obligations are for the purpose of facilitating construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents. However, any errors, inconsistencies or omissions discovered by the Contractor shall be reported promptly to the Architect/Engineer as a request for information in such form as the Architect/Engineer may require.
- 3.2.2. Any errors or omissions noted by the Contractor during this review shall be reported promptly to the Architect/Engineer, but it is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional unless otherwise specifically provided in the Contract Documents.
- 3.2.3. If the Contractor believes that additional cost or time is involved because of clarifications or instructions issued by the Architect/Engineer in response to the Contractor's notices or requests for information pursuant to Subparagraphs 3.2.1 and 3.2.2, the Contractor shall make Claims as provided in Subparagraphs 4.3.4 and 4.3.5. If the Contractor fails to perform the obligations of Subparagraphs 3.2.1 and 3.2.2, the Contractor shall pay such costs and damages to the Owner as would have been avoided if the Contractor had performed such obligations. The Contractor shall not be liable to the Owner or Architect/Engineer for damages resulting from errors, inconsistencies, or omissions in the Contract Documents or for differences between field measurements or conditions and the Contract Documents unless the Contractor recognized such error, inconsistency, omission or difference and failed to report it to the Architect/Engineer.

- 3.2.4. Except as otherwise expressly provided in this Contract, the Contractor assumes all risks, liabilities, costs, and consequences of performing any effort or work in accordance with any written or oral order (including but not limited to direction, instruction, interpretation, or determination) of a person not authorized in writing by the Owner to issue such an order.
- 3.2.5. By entering into this Contract, the Contractor acknowledges that it has informed itself fully regarding the requirements of the Drawings and Specifications, the General Conditions, the Supplementary General Conditions, all other documents comprising a part of the Contract Documents and all applicable laws, building codes, ordinances and regulations. Contractor hereby expressly acknowledges, guarantees, and warrants to the Owner that:
- 3.2.5.1. the Contract Documents are sufficient in detail and scope to enable Contractor to construct the finished project;
 - 3.2.5.2. no additional or further work should be required by Owner at the time of Owner's acceptance of the Work; and,
 - 3.2.5.3. when the Contractor's work is finished and the Owner accepts, the Work will be complete and fit for the purpose intended by the Contract Documents. This acknowledgment and guarantee does not imply that the Contractor is assuming responsibilities of the Architect/Engineer.
- 3.2.6. Sufficiency of Contract Documents: Prior to submission of its bid, and in all events prior to and upon signing the Contract, the Contractor certifies, warrants and guarantees that it has received, carefully reviewed, and evaluated all aspects of the Contract Documents and agrees that said Documents are adequate, consistent, coordinated, and sufficient for bidding and constructing the Work requested, intended, conceived, and contemplated therein.
- 3.2.6.1. The Contractor further acknowledges its continuing duty to review and evaluate the Contract Documents during the performance of its services and shall immediately notify the Architect/Engineer of any problems, conflicts, defects, deficiencies, inconsistencies, errors, or omissions it discovers in the Contract Documents and the Work to be constructed; and, any variances it discovers between the Contract Documents and applicable laws, statutes, building codes, rules or regulations.
 - 3.2.6.2. If the Contractor performs any Work which it knows or should have known due to its experience, ability, qualifications, and expertise in the construction industry, that involves problems, conflicts, defects, deficiencies, inconsistencies, errors, or omissions in the Contract Documents and the Work to be constructed and, any variances between the Contract Documents and applicable laws, statutes, building codes, rules or regulations, without prior written notification to the Architect/Engineer and without prior authorization to proceed from the Architect/Engineer, the Contractor shall be responsible for and bear the costs and delays (including costs of any delay) of performing such Work and all corrective actions as directed by the Architect/Engineer.
 - 3.2.6.3. Any and all claims resulting from the Contractor's failure, including those of any subcontractor or supplier, to carefully review, evaluate, and become familiar with all aspects of the Contract Documents shall be deemed void and waived by the Contractor.
- 3.2.7. Sufficiency of Site Conditions: Prior to submission of its bid, and in all events prior to and upon signing the Contract, the Contractor certifies, warrants and guarantees that it has visited, carefully reviewed, evaluated, and become familiar with all aspects of the site and local conditions at which the Project is to be constructed. The Contractor agrees that the Contract Documents are an adequate, consistent, coordinated, and sufficient representation of the site and local conditions for the Work.
- 3.2.7.1. The Contractor has reviewed and become familiar with all aspects with the Site Survey and Geotechnical Report for the Project and has a full understanding of the information provided therein.
 - 3.2.7.2. If the Work involves modifications, renovations, or remodeling of an existing structure(s) or other man-made feature(s), the Contractor certifies, warrants and guarantees that it has

reviewed, evaluated, and become familiar with all available as-built and record drawings, plans and specifications, and has thoroughly inspected and become familiar with the structure(s) or man-made feature(s).

- 3.2.7.3. Any and all claims resulting from the Contractor's failure, including those of any subcontractor or supplier, to visit, carefully review, evaluate, and become familiar with all aspects of the site, available geotechnical information, and local conditions at which the Project is to be constructed shall be deemed void and waived by the Contractor.

3.3. SUPERVISION AND CONSTRUCTION PROCEDURES

- 3.3.1. The Contractor shall supervise and direct the Work using the Contractor's best skill and attention recognizing that time and quality are of the essence of the Work. The Contractor shall be solely responsible for and have control over construction means, methods, techniques, sequences and procedures and for coordinating all portions of the Work under the Contract, unless the Contract Documents give other specific instructions concerning these matters. It is the responsibility of and incumbent upon the Contractor to ensure, confirm, coordinate, inspect and oversee all Work (which is inclusive of but not limited to all submittals, change orders, schedules, workmanship, and appropriate staffing with enough competent and qualified personnel) so that the Work is not impacted in terms of any delays, costs, damages, or additional time, or effort on the part Architect/Engineer or Owner. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences or procedures, the Contractor shall evaluate the jobsite safety thereof and, except as stated below, shall be fully and solely responsible for the jobsite safety of such means, methods, techniques, sequences or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely written notice to the Owner and Architect/Engineer and shall not proceed with that portion of the Work without further written instructions from the Architect/Engineer. If the Contractor is then instructed to proceed with the required means, methods, techniques, sequences or procedures without acceptance of changes proposed by the Contractor, the Architect/Engineer or Owner as appropriate shall be solely responsible for any resulting loss or damage. The Contractor will be required to: review any specified construction or installation procedure; advise the Architect/Engineer if the specified procedure deviates from good construction practice; to advise the Architect/Engineer if following the procedure will affect any warranties, including the Contractor's general warranty, or of any objections the Contractor may have to the procedure and shall propose any alternative procedure which the Contractor will warrant and guarantee. The Contractor is required to: review any specified construction or installation procedure; advise the Architect/Engineer if the specified procedure deviates from good construction practice; to advise the Architect/Engineer if following the procedure will affect any warranties, including the Contractor's general warranty, or of any objections the Contractor may have to the procedure and to propose any alternative procedure which the Contractor will warrant.
- 3.3.2. The Contractor shall furnish management, supervision, coordination, labor and services that: (1) expeditiously, economically, and properly completes the Work; (2) comply with all requirements of the Contract Documents; and, (3) are performed in a quality workmanlike manner and in accordance with the standards currently practiced by persons and entities performing or providing comparable management, supervision, labor and services on projects of similar size, complexity, cost, and nature to this Project. However, the standards currently practiced within the construction industry shall not relieve the Contractor of the responsibility to perform the Work to the level of quality, detail, and excellence defined and intended by the Contract Documents as interpreted by the Architect/Engineer.
- 3.3.3. All services and labor rendered by the Contractor, including any subcontractors or suppliers, shall be performed under the immediate supervision at the site of persons possessing expertise and the requisite knowledge in the discipline or trade of service being rendered. The Contractor shall maintain such supervision and personnel at all times that the Contractor's personnel, subcontractors, and/or suppliers are at the site. The Contractor shall never be absent from the site during performance of any portion of the Work by any entity under the supervision and direction of the Contractor. Full time attendance by the Contractor from Notice to Proceed through Final Acceptance is an explicit requirement of this Contract.

- 3.3.4. The Contractor shall be responsible to the Owner for acts, damages, errors, and omissions of the Contractor's employees, subcontractors and their agents and employees, and other persons or entities performing portions of the Work for or on behalf of the Contractor or any of its Subcontractors.
- 3.3.5. The Contractor shall be responsible for inspection of portions of Work already performed to determine that such portions are in proper condition to receive subsequent Work.

3.4. LABOR, WAGES, AND MATERIALS

- 3.4.1. Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, permits, licenses, goods, products, equipment, tools, construction equipment and machinery, water, heat, all utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work in accordance with the Contract Documents, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.
- 3.4.2. The Contractor may make substitutions only with the consent of the Owner, after evaluation by the Architect/Engineer and in accordance with a Change Order. This opportunity to request substitutions does not negate or waive any requirement for the Contractor to follow a pre-bidding "prior approval" requirement nor obligate the Owner to approve any substitution request.
- 3.4.3. The Contractor shall enforce strict discipline, appropriate behavior, and good order among the Contractor's employees, subcontractors at every tier and level, and other persons carrying out the Contract. The Contractor shall not permit employment of unfit persons or persons not skilled in tasks assigned to them.
- 3.4.4. Prevailing Wages and Montana Residents.
 - 3.4.4.1. The Contractor and all subcontractors at any level or tier of the Work shall give preference to the employment of bona fide Montana residents in the performance of the Work and shall pay the standard prevailing rate of wages, including fringe benefits for health and welfare and pension contributions and travel allowance provisions in effect and applicable to the county or locality in which the work is being performed. (18-2-403, MCA)
 - 3.4.4.2. At least 50% of the workers, as defined by the Department of Labor & Industry (DOLI), must be bona fide Montana residents. (18-2-401, 18-2-402, MCA)
 - 3.4.4.3. Indian Employment Preference within the Boundaries of an Indian Reservation. All contractors that are awarded a state agency construction contract within the exterior boundaries of an Indian Reservation shall extend a hiring preference to qualified Indians as provided herein:
 - 3.4.4.3.1. "State agency" means a department, office, board, bureau, commission, agency, or other instrumentality of the executive or judicial branches of the government of this State. "Indian" means a person who is enrolled or who is a lineal descendent of a person enrolled in an enrollment listing of the Bureau of Indian Affairs or in the enrollment listing of a recognized Indian tribe domiciled in the United States.
 - 3.4.4.3.2. Qualified Indians – Employment Criteria: An Indian shall be qualified for employment in a permanent, temporary, or seasonal position if he or she has substantially equal qualifications for any position and resides on the reservation where the construction contract is to be performed.
 - 3.4.4.3.3. Non-Applicability: The Indian Employment Preference Policy does not apply to a project partially funded with federal-aid money from the United States Department of Transportation or when residency preference laws are specifically prohibited by federal law. It does not apply to independent contractors and their employees, student interns, elected officials, or appointed positions.
 - 3.4.4.4. The Commissioner of The Montana Department of Labor and Industry (DOLI) has established the standard prevailing rate of wages in accordance with 18-2-401 and 18-2-402, MCA. A copy of the Rates entitled "State of Montana, Prevailing Wage Rates" are bound herein. The Commissioner of the Montana DOLI has established the resident requirements in accordance with 18-2-409, MCA. The Contractor and all subcontractors at any level or tier of the Work

shall direct any and all questions concerning prevailing wage and Montana resident issues for all aspects of the Work to DOLI.

- 3.4.4.5. The Contractor and all subcontractors at any tier or level of the Work, and as determined by the Montana DOLI, shall classify all workers in the project in accordance with the State of Montana, Prevailing Wage Rates. In the event the Contractor is unable to classify a worker in accordance with these rates he shall contact DOLI for a determination of the classification and the prevailing wage rate to be paid.
- 3.4.4.6. The Contractor and all subcontractors at any tier or level of the Work shall be responsible for obtaining wage rates for all workers prior to their performing any work on the project. The Contractor is required to pay and insure that its subcontractors at any tier or level and others also pay the prevailing wage determined by the DOLI, insofar as required by Title 18 of the MCA and the pertinent rules and standards of DOLI.
- 3.4.4.7. It is not the responsibility of the Owner to determine who classifies as a subcontractor, sub-subcontractor, material man, supplier, or any other person involved in any aspect of the Work at any tier or level. All such determinations shall be the sole responsibility of the Contractor, subcontractors, sub-subcontractors, material men, suppliers and others involved in the project at any tier or level. The Contractor, subcontractors, sub-subcontractors, material men, suppliers and others involved in the project shall indemnify and hold harmless the Owner from all claims, attorneys' fees, damages and/or awards involving prevailing wage or Montana resident issues. Any changes to wages or penalties for failure to pay the correct wages will be the sole responsibility of the Contractor and/or his subcontractors and no further charges or claims shall be made to the Owner. If the parties mutually agree or an arbitrator or court determines that any change in wages is due and any part is attributable to the Owner, the Owner's sole liability shall be for the amount of wages ordered only and not for other expenses, charges, penalties, overhead, profit or other mark-ups.
- 3.4.4.8. In accordance with 18-2-422(1) MCA, each job classification's standard prevailing wage rate, including fringe benefits, that the contractors and employers shall pay during construction of the project is included herein by both reference to DOLI's "Building" or "Heavy/Highway" schedules and as part of these Contract Documents.
- 3.4.4.9. The Contractor and every employer, including all subcontractors at any tier or level, is required by 18-2-422(2) MCA to maintain payroll records in a manner readily capable of being certified for submission under 18-2-423 MCA, for a period of not less than 3 years after the contractor's, subcontractor's, or employer's completion of work on the project or the Final Acceptance by the Owner, whichever is later.
- 3.4.4.10. Each contractor is required by 18-2-422(3) MCA to post in a visible and accessible location a statement of all wages and fringe benefits in compliance with 18-2-423.

3.5. WARRANTY AND GUARANTEE

- 3.5.1. The Contractor warrants to the Owner and Architect/Engineer that materials and equipment furnished under the Contract will be new and of good quality unless otherwise required or permitted by the Contract Documents, that the Work will be free from defects not inherent in the quality required or permitted, and that the Work will conform to the requirements of the Contract Documents. Work not conforming to these requirements, including substitutions not properly approved and authorized, may be considered defective and rejected. The Contractor's warranty excludes remedy for damage or defect caused by abuse, modifications not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Architect/Engineer, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.
- 3.5.2. The Contractor shall and does hereby warrant and guarantee all work, workmanship, and materials for the full warranty period as specified in the Contract Documents. The warranty period shall be defined as commencing with Substantial Completion (or with each Substantial Completion if there is more than one) of the Project, or any portion thereof, and continuing for one (1) calendar year from the date of Final Acceptance of the entire project by the Owner. The date of Final Acceptance shall be the date of the

Architect/Engineer's signature on the final request for payment unless otherwise agreed upon in writing for the entire project or any portion thereof, by the Owner, Architect/Engineer and Contractor.

3.5.3. In addition to the one (1) calendar year warranty and guarantee specified in this herein above, the Contractor warrants and guarantees all materials and workmanship for the roofing system for a period of two (2) calendar years from the date of Final Acceptance. This warranty shall cover all labor and materials for roof and roofing finish systems (e.g. flashing, terminations, parapet caps, etc.) repairs from moisture penetration and/or defects in workmanship.

3.5.4. Manufacturer and product warranties and guarantees, as provided by the manufacturer or as specified in the Contract Documents, are in addition to the Contractor's warranty.

3.6. TAXES

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

3.6.2. In compliance with 15-50-206 MCA, the Contractor will have 1% of his gross receipts withheld by the Owner from all payments due and sent to the Montana Department of Revenue. Each subcontractor who performs work greater than \$5,000 shall have 1% of its gross receipts withheld by the Contractor and sent to the Montana Department of Revenue. The Contractor shall notify the Department of Revenue on the Department's prescribed form.

3.7. PERMITS, FEES, AND NOTICES

3.7.1. Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit and other permits and governmental fees, licenses and inspections necessary for proper execution and completion of the Work which are customarily secured after execution of the Contract, including but not limited to, the building permit fee, electrical, plumbing, sewer connection fee and mechanical permit fee, and any required impact fees and which are legally required when bids are received or negotiations concluded.

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

3.7.3. If the Contractor performs Work knowing it to be contrary to laws, statutes, ordinances, building codes, and rules and regulations, and does so without providing notice to the Architect/Engineer and Owner, the Contractor shall assume responsibility for such Work and shall bear the costs attributable to correction. The Contractor shall be solely responsible to insure that all work it performs is in full compliance with all prevailing and applicable codes and regulations.

3.7.4. Incident Reporting: The Contractor shall immediately notify the Owner and Architect/Engineer, both orally and in writing, of the nature and details of all incidents which may adversely affect the quality or progress of the Work, including, but not limited to, union disputes, accidents, delays, damages to Work, and other significant occurrences. Such notices are in addition to any other notices required regarding claims.

3.8. ALLOWANCES

3.8.1. The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct.

3.8.2. Unless otherwise provided in the Contract Documents:

3.8.2.1. allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;

3.8.2.2. Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit and other expenses contemplated for stated allowance amounts shall be included by the Contractor in the Contract Sum but not in the allowances;

3.8.2.3. whenever costs are more than or less than stated allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect: (1) the difference between actual costs and the allowances under Clause 3.8.2.1; and, (2) changes in Contractor's costs under Clause 3.8.2.2.

3.8.3. Materials and equipment under an allowance shall be selected by the Owner.

3.9. CONTRACTOR'S PERSONNEL

3.9.1. The Contractor shall employ competent personnel, supervisors, project managers, project engineers, project superintendent, and all others who shall be assigned to the Work throughout its duration. Contractor's personnel extend to those employed by the Contractor whether at the site or not. The Owner shall have right to review and approve or reject all replacement of Contractor's personnel. All personnel assigned by the Contractor to the Work shall possess the requisite experience, skills, abilities, knowledge, and integrity to perform the Work.

3.9.2. The superintendent and others as assigned shall be in attendance at the Project site during the performance of any and all Work. The superintendent shall represent the Contractor. All communications given to the Contractor's personnel such as the project manager or the superintendent, whether verbal, electronic or written, shall be as binding as if given to the Contractor.

3.9.3. It is the Contractor's responsibility to appropriately staff, manage, supervise and direct the Work which is inclusive of the performance, acts, and actions of his personnel and subcontractors. As such, the Contractor further agrees to indemnify and hold harmless the Owner and the Architect/Engineer, and to protect and defend both from and against all claims, attorneys' fees, demands, causes of action of any kind or character, including the cost of defense thereof, arising in favor of or against the Owner, Architect/Engineer, Contractor, their agents, employees, or any third parties on account of the performance, behavior, acts or actions of the Contractor's personnel or subcontractors.

3.9.4. Prior to the commencement of any work, the Contractor shall prepare and submit a personnel listing and organizational chart in a format acceptable to the Owner which lists by name, phone number (including cell phone), job category, and responsibility the Contractor's key/primary personnel who will work on the Project. The Contractor shall promptly inform the Owner in writing of any proposed replacements, the reasons therefore, and the name and qualifications of any proposed replacements. The Owner shall have the right to reject any proposed replacements without cost or claim being made by the Contractor. The chart shall be provided to the Owner at the time of the pre-construction conference.

3.9.5. The Contractor shall immediately remove for the duration of the Project, any person making an inappropriate racial, sexual, or ethnic comment, statement, joke, or gesture toward any other individual.

3.9.6. The Contractor shall immediately remove for the duration of the Project, any person who is incompetent, careless, disruptive, or not working in harmony with others.

3.10. CONSTRUCTION SCHEDULES

3.10.1. The Contractor shall, promptly after being awarded the Contract, prepare and submit for the Owner's and Architect/Engineer's information a Contractor's construction schedule for the Work. The schedule shall not exceed time limits current under the Contract Documents, shall be revised at appropriate intervals as required by the conditions of the Work and per the requirements of the Contract Documents, shall be related to the entire Project to the extent required by the Contract Documents, and shall provide for expeditious and practicable execution of the Work. The Contractor's schedule shall be in the "Critical Path Method" and shall show the Critical Path of the Work in sufficient detail to evaluate the Contractor's progress. A request for time extension by the Contractor will not be allowed unless a change in the Work is approved by the Owner and materially affects the Critical Path. It is the Contractor's responsibility to demonstrate that any time extensions requests materially affect the Critical Path.

- 3.10.2. The Contractor shall prepare and keep current, for the Architect/Engineer's approval, a schedule of submittals which is coordinated with the Contractor's Construction Schedule and allows the Architect/Engineer reasonable time to review submittals.
- 3.10.3. The Contractor shall perform the Work in accordance with the most recent schedule submitted to the Owner and Architect/Engineer.
- 3.10.4. The Contractor's operations (including but not limited to the Contractor's forces employed, sequences of operations, and methods of operation) at all times during the performance of the contract shall be: (a) subject to the review of the Owner or the Architect/Engineer; and, (b) sufficient to insure the completion of the Work within the specified performance period.
- 3.10.5. The Critical Path Method Construction Schedule prepared by the Contractor must be in a form that is acceptable to both the Architect/Engineer and the Owner.
 - 3.10.5.1. The Schedule shall show the estimated progress of the entire Project through the individual time periods allowed for completion of each discipline, trade, phase, section, and aspect of the Work. The Contractor shall provide written reports of all logic and resource loading data with the Schedule and with all updates to the Schedule.
 - 3.10.5.2. The Schedule shall show percent complete, progress to date, project work, and projected time to complete the work for all activities. The percent complete and minor schedule changes, including additions of activities, change orders, construction change directives, changes to sequences of activities and significant changes in activity demands must be shown by a revised Schedule. A written report providing details about the changes and what actions are anticipated to get the work completed in the contractual time period shall be submitted with the revised schedule.
 - 3.10.5.3. The Construction Schedule shall include coordinate dates for performance of all divisions of the Work, including shipping and delivery, off-site requirements and tasks, so the Work can be completed in a timely and orderly fashion consistent with the required dates of Substantial Completion and Final Acceptance.
 - 3.10.5.4. The Construction Schedule shall include: (i) the required commencement date, the required dates of Substantial Completion(s) and Final Acceptance for the complete Project and all phases (if any); (ii) any guideline and milestone dates required by the Owner or the Contract Documents; (iii) subcontractor and supplier schedules; (iv) a submittal schedule which allows sufficient time for review and action by the Architect/Engineer; (v) the complete sequence of all construction activities with start and completion dates; and, (vi) required decision dates.
 - 3.10.5.5. By receiving, reviewing, and/or commenting on the Construction Schedule or any portion thereof (including logic and resource loading), neither the Owner or Architect/Engineer assume any of the Contractor's responsibility or liability that the Schedule be coordinated or complete, or for timely and orderly completion of the Work.
 - 3.10.5.6. Receiving, reviewing, and/or commenting on the Schedule, any portion thereof, or any revision thereof, does not constitute an approval, acknowledgement, or acceptance of any duration, dates, milestones, or performance indicated therein.
 - 3.10.5.7. A printout of the Schedule's logic showing all activities and all resource loading is required with the Schedule and with all updates to the Schedule.
- 3.10.6. The Contractor shall review and compare, at a minimum on a weekly basis, the actual status of the Work against its Construction Schedule.
- 3.10.7. The Contractor shall routinely, frequently, and periodically (but not less than monthly) update and/or revise its Construction Schedule to show actual progress of the Work through the date of the update or revision, projected level of completion of each remaining activity, activities modified since the previous update or revision, and major changes in scope or logic. The updated/revised Schedule shall be accompanied by a narrative report which: (1) states and explains any modifications of the critical path, if

any, including any changes in logic; (2) defines problem areas and lists areas of anticipated delays; (3) explains the anticipated impact the change in the critical path or problems and delays will have on the entire Schedule and the completion of the Work; (4) provides corrective action taken or proposed; and, (5) states how problems or delays will be resolved in order to deliver the Work by the required phasing milestones (if any), Substantial Completion(s), and Final Acceptance dates.

- 3.10.8. Delay in Performance: If at any time the Contractor anticipates that performance of the Work will be delayed or has been delayed, the Contractor shall: (1) immediately notify the Architect/Engineer by separate and distinct correspondence of the probable cause and effect of the delay, and possible alternatives to minimize the delay; and, (2) take all corrective action reasonably necessary to deliver the Work by the required dates. Nothing in this paragraph or the Contract Documents shall be construed by the Contractor as a granting by the Architect/Engineer or Owner of constructive acceleration. The results of failure to anticipate delays, or to timely notify the Owner and Architect/Engineer of an anticipated or real delay, are entirely the responsibility of the Contractor whether compensable or not.
- 3.10.9. Early Completion: The Contractor may attempt to achieve Substantial Completion(s) on or before the date(s) required in the Contract. However, such early completion shall be for the Contractor's sole convenience and shall not create any real or implied additional rights to Contractor or impose any additional obligations on the Owner or Architect/Engineer. The Owner will not be liable for nor pay any additional compensation of any kind to the Contractor for achieving Substantial Completion(s) or Final Acceptance prior to the required dates as set forth in the Contract. The Owner will not be liable for nor pay any additional compensation of any kind should there be any cause whatsoever that the Contractor is not able to achieve Substantial Completion(s) earlier than the contractually required dates of Substantial Completion(s) or Final Acceptance.
- 3.10.10. Float in Schedule. Any and all float time in the Contractor's schedule, regardless of the path or activity, shall accrue to the benefit of the Owner and the Work, and not to the Contractor. Float also includes any difference shown between any early completion dates shown on the Contractor's Schedule for any phasing milestone(s), Substantial Completion(s) or Final Acceptance and the dates or durations as required by the Contract Documents.
- 3.10.11. Modification of Required Substantial Completion(s) or Final Acceptance Dates: Modification of the required dates shall be accomplished only by duly authorized, accepted, and approved change orders stating the new date(s) with specificity on the change order form. All rights, duties, and obligations, including but not limited to the Contractor's liability for actual, delay, and/or liquidated damages, shall be determined in relation to the date(s) as modified.

3.11. DOCUMENTATION AND AS-BUILT CONDITIONS AT THE SITE

- 3.11.1. The Contractor shall maintain at the site for the Owner one record copy of the Drawings, Specifications, Addenda, Change Orders and other Modifications, in good order and accurately marked to record current field changes and selections made during construction, and one record copy of approved Shop Drawings, Product Data, Samples and similar required submittals. These shall be available to the Architect/Engineer or Owner at any time and shall be delivered to the Architect/Engineer for submittal to the Owner upon completion of the Work.
- 3.11.2. The Owner shall not be required to process final payment until all documentation and data required by the Contract Documents is submitted to and approved by the Architect/Engineer including, but not limited to, the As-Built Drawings. The Owner will not process any final request for payment until the Architect/Engineer has received and verified that the Contractor has performed the requirements pertaining to the as-built drawings.
- 3.11.3. The as-built drawings shall be neatly and clearly marked during construction to record all deviations, variations, changes, and alterations as they occur during construction along with such supplementary notes and details necessary to clearly and accurately represent the as-built condition. The as-built drawings shall be available at all times to the Owner, Architect/Engineer and Architect/Engineer's consultants.

3.12. SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

3.12.1. Definitions:

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

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

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

3.12.2. Shop Drawings, Product Data, Samples and similar submittals are not Contract Documents. The purpose of their submittal is to demonstrate for those portions of the Work for which submittals are required by the Contract Documents the way by which the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents. Review by the Architect/Engineer is subject to the limitations of Subparagraph 4.2.7. Informational submittals upon which the Architect/Engineer is not expected to take responsive action may be so identified in the Contract Documents. Submittals which are not required by the Contract Documents may be returned by the Architect/Engineer without action.

3.12.3. The Contractor shall review, approve, and submit to the Architect/Engineer, Shop Drawings, Product Data, Samples and similar submittals required by the Contract Documents within sixty (60) calendar days of being issued the Notice To Proceed unless noted otherwise and shall do so in such sequence as to cause no delay in the Work or in the activities of the Owner or of separate contractors. Any and all items submitted by the Contractor which are not marked as reviewed for compliance with the Contract Documents and approved by the Contractor, or in the opinion of the Architect/Engineer, have not been reviewed for compliance by the Contractor even if marked as such, may be returned by the Architect/Engineer without action and shall not result in any accusation or claim for delay or cost by the Contractor. Any submittal that, in the opinion of the Architect/Engineer, is incomplete in any area or detail may be rejected and returned to the Contractor. It is the responsibility of and incumbent upon the Contractor to ensure and confirm that all submittals are complete, accurate, and in conformance to the Contract Documents prior to submission.

3.12.4. By approving and submitting Shop Drawings, Product Data, Samples and similar submittals, the Contractor represents and guarantees to the Architect/Engineer and Owner that the Contractor has determined and verified materials, field measurements and field construction criteria related thereto, or will do so, and has checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

3.12.5. The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples or similar submittals until the respective submittal has been approved by the Architect/Engineer. Should the Contractor, Subcontractors or Sub-subcontractors install, construct, erect or perform any portion of the Work without approval of any requisite submittal, the Contractor shall bear the costs, responsibility, and delay for removal, replacement, and/or correction of any and all items, material, and /or labor.

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

3.12.7. The Contractor shall direct specific attention, in writing or on re-submitted Shop Drawings, Product Data, Samples or similar submittals, to revisions other than those requested by the Architect/Engineer on previous submittals. In the absence of such written notice the Architect/Engineer's approval of a re-submission shall not apply to such revisions.

- 3.12.8. The Contractor shall not be required to provide professional services which constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. The Contractor shall not be required to provide professional services in violation of applicable law. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect/Engineer will specify all performance and design criteria that such services must satisfy. The Contractor shall cause such services or certifications to be provided by a properly licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect/Engineer. The Owner and the Architect/Engineer shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications or approvals performed by such design professionals, provided the Owner and Architect/Engineer have specified to the Contractor all performance and design criteria that such services must satisfy. Pursuant to this subparagraph, the Architect/Engineer will review, approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Contractor shall not be responsible for the adequacy of the performance or design criteria required by the Contract Documents but shall be responsible and held liable for review and verification of all performance or design criteria as required by Paragraph 3.2.
- 3.12.9. Unless noted otherwise in the Contract Documents, the Contractor shall submit to the Architect/Engineer within sixty (60) days from the date of the Notice To Proceed a minimum of six (6) complete copies of all shop/setting drawings, schedules, cut sheets, products, product data, and samples required for the complete Work. Copies shall be reviewed, marked, stamped and approved on each and every copy by the Contractor prior to submission to the Architect/Engineer or they shall be returned without review or action. The Architect/Engineer shall review with reasonable promptness, making corrections, rejections, or other actions as appropriate. The Architect/Engineer's approval or actions on shop/setting drawings, schedules, cut sheets, products, product data, or samples shall not relieve the Contractor from responsibility for, nor deviating from, the requirements of the plans and specifications. Any deviations from the plans and specifications requested or made by the Contractor shall be brought promptly to the attention of the Architect/Engineer.
- 3.12.10. Cost for Re-Submissions: the Contractor is responsible for ensuring that all shop drawings, product data, samples, and submittals contain all information required by the Contract Documents to allow the Architect/Engineer to take action. The Contractor shall pay the Architect/Engineer's cost for any re-submission of any rejected item. Such costs shall be deducted from the contract sum by Change Order. The Contractor agrees that any action taken by the Architect/Engineer is solely in the Architect/Engineer's discretion and is non-negotiable for the purposes of the Architect/Engineer's cost recovery for multiple (i.e. more than one) review.

3.13. USE OF SITE

- 3.13.1. The Contractor shall confine operations at the site to areas permitted by law, ordinances, permits and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.
- 3.13.2. The Contractor shall not damage, endanger, compromise or destroy any part of the Project or the site, including but not limited to work performed by others, monuments, stakes, bench marks, survey points, utilities, existing features or structures. The Contractor shall be fully and exclusively responsible for and bare all costs and delays (including and costs of delay) for any damage, endangerment, compromise, or destruction of any part of the Project or site.

3.14. CUTTING AND PATCHING

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

- 3.14.2. The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or separate contractors by cutting, patching or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter such construction by the Owner or a separate contractor except with written consent of the Owner and of such separate contractor; such consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold from the Owner or a separate contractor the Contractor's consent to cutting or otherwise altering the Work.

3.15. CLEAN UP AND SITE CONTROL

- 3.15.1. The Contractor shall keep the premises and surrounding area free from accumulation of waste materials or rubbish caused by operations under the Contract during performance of the Work and at the direction of the Owner or Architect/Engineer. At completion of the Work, the Contractor shall remove from and about the Project waste materials, rubbish, the Contractor's tools, construction equipment, machinery and surplus materials.
- 3.15.2. If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and the cost thereof shall be charged to the Contractor.

3.16. ACCESS TO WORK

- 3.16.1. The Contractor shall provide the Owner and Architect/Engineer access to the Work at all times wherever located.

3.17. ROYALTIES, PATENTS AND COPYRIGHTS

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

3.18. INDEMNIFICATION

- 3.18.1. To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the Owner, Architect/Engineer, Architect/Engineer's consultants, and agents and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity which would otherwise exist as to a party or person described in this Paragraph. The Contractor agrees that it will defend, protect, indemnify and save harmless the State of Montana and the Owner against and from all claims, liabilities, demands, causes of action, judgments (including costs and reasonable attorneys' fees), and losses from any cause whatever (including patent, trademark and copyright infringement) except the Owner's sole or partial negligence. This includes any suits, claims, actions, losses, costs, damages of any kind, including the State and Owner's legal expenses, arising out of, in connection with, or incidental to the Contract, but does not include any such suits, claims, actions, losses, costs or damages which are the result of the negligent acts, actions, losses, costs, or damages which are acts, omissions or misconduct of the Owner if they do not arise out of, depend upon or relate to a negligent act, omission or misconduct of the Contractor in whole or in part.
- 3.18.2. In claims against any person or entity indemnified under this Paragraph 3.18 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, the indemnification obligation under Subparagraph 3.18.1 shall not be limited by a limitation on amount or type of damages, compensation or benefits payable by or for the Contractor or a Subcontractor under workers' compensation acts, disability benefit acts or other employee benefit acts.

ARTICLE 4 – ADMINISTRATION OF THE CONSTRUCTION CONTRACT

4.1. THE ARCHITECT/ENGINEER

- 4.1.1. The Architect/Engineer is the person lawfully licensed to practice or an entity lawfully practicing identified as such in the Agreement with the Owner and is referred to throughout the Contract Documents as if singular in number. The term “Architect/Engineer” means the Architect/Engineer’s duly authorized representative.
- 4.1.2. Duties, responsibilities and limitations of authority of the Architect/Engineer as set forth in the Contract Documents shall not be restricted, modified or extended without written consent of the Owner.
- 4.1.3. If the employment of the Architect/Engineer is terminated, the Owner shall employ a new Architect/Engineer at the sole choice and discretion of the Owner, whose status under the Contract Documents shall be that of the former Architect/Engineer.

4.2. ARCHITECT/ENGINEER’S ADMINISTRATION OF THE CONSTRUCTION CONTRACT

- 4.2.1. The Architect/Engineer will provide administration of the Contract as described in the Contract Documents, and will be an Owner’s representative throughout the complete duration of the Project, including the warranty period. The Architect/Engineer will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents, unless otherwise modified in writing in accordance with the Architect/Engineer Contract.
- 4.2.2. The Architect/Engineer, as a representative of the Owner, will visit the site at intervals appropriate to the stage of the Contractor’s operations to: (1) become generally familiar with and to keep the Owner informed about the progress and quality of the portion of the Work completed; (2) endeavor to guard the Owner against defects and deficiencies in the Work; and, (3) to determine in general if the Work is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Owner and Architect/Engineer will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Contractor’s Work. The Owner and Architect/Engineer will neither have control over or charge of, nor be responsible for, the construction means, methods, techniques, sequences or procedures, for the safety of any person involved in the work, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor’s rights and responsibilities under the Contract Documents.
- 4.2.3. The Architect/Engineer will not be responsible for the Contractor’s failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect/Engineer will not have control over or charge of and will not be responsible for acts or omissions of the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.
- 4.2.4. Communications Facilitating Contract Administration. Except as otherwise provided in the Contract Documents or when direct communications have been specially authorized, the Owner and Contractor shall endeavor to communicate with each other through the Architect/Engineer about matters arising out of or relating to the Contract. Communications by and with the Architect/Engineer’s consultants shall be through the Architect/Engineer. Communications by and with Subcontractors and material suppliers shall be through the Contractor to the Architect/Engineer. Communications by and with separate contractors shall be through the Owner to the Architect/Engineer.
- 4.2.5. Based on the Architect/Engineer’s evaluations of the Contractor’s Applications for Payment, the Architect/Engineer will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts. The Contractor is fully aware that the Owner (i.e. the State of Montana) has established a billing cycle for processing payments in Article 9 of these General Conditions. The Contractor and all Subcontractors are subject to all provisions of Title 28, Chapter 2, Part 21 MCA regarding all aspects of the Work.
- 4.2.6. The Architect/Engineer will have authority to reject Work that does not conform to the Contract Documents. Whenever the Architect/Engineer considers it necessary or advisable, the Architect/Engineer

will have authority to require inspection or testing of the Work in accordance with the General Conditions and any applicable technical specification requirements, whether or not such Work is fabricated, installed or completed. However, neither this authority of the Architect/Engineer nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect/Engineer to the Contractor, Subcontractors, material and equipment suppliers, their agents or employees, or other persons or entities performing portions of the Work.

- 4.2.7. The Architect/Engineer will review and approve or take other appropriate action upon the Contractor's submittals such as Shop Drawings, Product Data and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect/Engineer's action will be taken with such reasonable promptness as to cause no delay in the Work or in the activities of the Owner, Contractor or separate contractors, while allowing sufficient time in the Architect/Engineer's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect/Engineer's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Paragraphs 3.3, 3.5 and 3.12. The Architect/Engineer's review shall not constitute approval of safety precautions or, unless otherwise specifically stated by the Architect/Engineer, of any construction means, methods, techniques, sequences or procedures. The Architect/Engineer's approval of a specific item shall not indicate approval of an assembly of which the item is a component.
- 4.2.8. The Architect/Engineer will prepare Change Orders and Construction Change Directives, and may authorize minor changes in the Work as provided in Paragraph 7.4.
- 4.2.9. The Architect/Engineer will conduct inspections to determine the date or dates of Substantial Completion(s) and the date of Final Acceptance, will receive and forward to the Owner, for the Owner's review and records, written warranties and related documents required by the Contract and assembled by the Contractor, and will issue a final Certificate for Payment upon compliance with the requirements of the Contract Documents.
- 4.2.10. If the Owner and Architect/Engineer agree, the Architect/Engineer will provide one or more project representatives to assist in carrying out the Architect/Engineer's responsibilities. The duties, responsibilities and limitations of authority of such project representatives shall be as set forth in the Owner's Agreement with the Architect/Engineer.
- 4.2.11. The Architect/Engineer will interpret and decide matters concerning performance under and requirements of the Contract Documents on written request of either the Owner or Contractor. The Architect/Engineer's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If no agreement is made concerning the time within which interpretations required of the Architect/Engineer shall be furnished in compliance with this Paragraph 4.2, then delay shall not be recognized on account of failure by the Architect/Engineer to furnish such interpretations until 15 days after written request is made for them.
- 4.2.12. Interpretations and decisions of the Architect/Engineer will be consistent with the intent of and reasonably inferable from the Contract Documents and will be in writing or in the form of drawings. When making such interpretations and initial decisions, the Architect/Engineer will endeavor to secure faithful performance by both Owner and Contractor, will not show partiality to either and will render such interpretations and decisions in good faith.
- 4.2.13. The Architect/Engineer's decisions on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents.
- 4.2.14. The Architect/Engineer's or Owner's observations or inspections do not alleviate any responsibility on the part of the Contractor. The Architect/Engineer and the Owner reserves the right to observe and inspect the work and make comment. Action or lack of action following observation or inspection is not to be construed as approval of Contractor's performance.

4.3. CLAIMS AND DISPUTES

- 4.3.1. Definition. A Claim is a demand or assertion by one of the parties seeking, as a matter of right, adjustment or interpretation of Contract terms, payment of money, extensions of time or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes, controversies, and matters in question between the Owner and Contractor arising out of or relating to the Contract. Claims must be initiated by written notice. The responsibility to substantiate Claims shall rest solely with the party making the Claim.
- 4.3.1.1. Time Limits on Claims. Claims by either party must be initiated within 21 calendar days after occurrence of the event giving rise to such claim. The following shall apply to the initiation of a claim:
- 4.3.1.1.1. A written notice of a claim must be provided to the Architect/Engineer and the other party within 21 calendar days after the occurrence of the event or the claim is waived by the claiming party and void in its entirety.
- 4.3.1.1.2. Claims must be initiated by separate, clear, and distinct written notice within the 21 calendar day time frame to the Architect/Engineer and the other party and must contain the notarized statement in Sub-Paragraph 4.3.1.5 when the claim is made by the Contractor. Discussions in any form with the Architect/Engineer or Owner, whether at the site or not, do not constitute initiation of a claim. Notes in project meeting minutes, email correspondence, change order proposals, or any other form of documentation does not constitute initiation of a claim. The written notice must be a separate and distinct correspondence provided in hardcopy to both the Architect/Engineer and Owner and must delineate the specific event and outline the causes and reasons for the claim whether or not cost or time have been fully determined. Written remarks or notes of a generic nature are invalid in their entirety. Comments made at progress meetings, project site visits, inspections, emails, voice mails, and other such communications do not meet the requirement of providing notice of claim.
- 4.3.1.1.3. Physical Injury or Physical Damage. Should the Owner or Contractor suffer physical injury or physical damage to person or property because of any error, omission, or act of the other party or others for whose acts the other party is legally and contractually liable, claim will be made in writing to the other party within a reasonable time of the first observance of such physical injury or physical damage but in no case beyond 30 calendar days of the first observance. The notice shall provide sufficient detail to enable the other party to investigate the matter. The provisions of this paragraph shall not be construed as a substitute for or a waiver of the provisions of any applicable statute of limitations or repose. In all such cases, the indemnification provisions of the Contract shall be effectual and the Contractor's insurance shall be primary and in full effect.
- 4.3.1.2. All Claims must contain sufficient justification and substantiation with the written notice or they may be rejected without consideration by the Architect/Engineer or other party with no additional impact or consequence to the Contract Sum, Contract Time, or matter(s) in question in the Claim.
- 4.3.1.3. If additional compensation is claimed, the exact amount claimed and a breakdown of that amount into the following categories shall be provided with each and every claim:
- 4.3.1.3.1. Direct costs (as listed in Subparagraph 7.3.9.1 through 7.3.9.5);
- 4.3.1.3.2. Indirect costs (as defined in Paragraph 7.2.5); and,
- 4.3.1.3.3. Consequential items (i.e. time extensions, credits, logic, reasonableness, impacts, disruptions, dilution) for the change.
- 4.3.1.4. If additional time is claimed the following shall be provided with each and every claim:
- 4.3.1.4.1. The specific number of days and specific dates for which the additional time is sought;
- 4.3.1.4.2. The specific reasons, causes, and/or effects whereby the Contractor believes that additional time should be granted; and,

4.3.1.4.3. The Contractor shall provide analyses, documentation, and justification of its claim for additional time in accordance with the latest Critical Path Method schedule in use at the time of event giving rise to the claim.

4.3.1.5. With each and every claim, the Contractor shall submit to the Architect/Engineer and Owner a notarized statement containing the following language:

"Under penalty of law (including perjury and/or false/fraudulent claims against the State), the undersigned,

(Name) (Title)

Of _____
(Company) (Date)

hereby certifies, warrants, and guarantees that this claim made for Work on this Contract is a true statement of the costs, adjustments and/or time sought and is fully documented and supported under the contract between the parties.

(Signature) (Date)"

4.3.2. Continuing Contract Performance.

4.3.2.1. Pending final resolution of a Claim except as otherwise agreed in writing or as provided in Subparagraph 9.7.1 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents on the portion of the Work not involved in a Claim.

4.3.3. Claims for Cost or Time for Concealed or Unknown Conditions.

4.3.3.1. If conditions are encountered at the site which are: (1) subsurface or otherwise concealed physical conditions which differ materially from those indicated in the Contract Documents; or, (2) 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 notice by the observing party shall be given to the other party promptly before conditions are disturbed.

4.3.3.2. The Architect/Engineer will promptly investigate such conditions and, if they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend an equitable adjustment in the Contract Sum or Contract Time, or both. If the Architect/Engineer determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect/Engineer shall so notify the Owner and Contractor in writing, stating the reasons. Claims by either party in opposition to such determination must be made within 21 days after the date of the Architect/Engineer's decision.

4.3.3.3. If the conditions encountered are materially different, the Contract Sum and Contract Time shall be equitably adjusted, but if the Owner and Contractor cannot agree on an adjustment in the Contract Sum or Contract Time, the adjustment shall be referred to the Architect/Engineer for initial determination, subject to further proceedings pursuant to Paragraph 4.4.

4.3.3.4. Nothing in this paragraph shall relieve the Contractor of its obligation to adequately and sufficiently investigate, research, and examine the site, the site survey, topographical information, and the geotechnical information available whether included by reference or fully incorporated in the Contract Documents.

4.3.4. Claims for Additional Cost.

- 4.3.4.1. If the Contractor wishes to make Claim for an increase in the Contract Sum, written notice as provided herein shall be given before proceeding to execute the Work. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Paragraph 10.6.
- 4.3.4.2. If the Contractor believes additional cost is involved for reasons including but not limited to: (1) a written interpretation from the Architect/Engineer; (2) an order by the Owner to stop the Work solely for the Owner's convenience or where the Contractor was not at least partially at fault; (3) a written order for a minor change in the Work issued by the Architect/Engineer; (4) failure of payment by the Owner per the terms of the Contract; (5) termination of the Contract by the Owner; or, (6) other reasonable grounds, Claim must be filed in accordance with this Paragraph 4.3.

4.3.5. Claims for Additional Time

- 4.3.5.1. If the Contractor wishes to make Claim for an increase in the Contract Time, written notice as specified in these General Conditions shall be provided along with the notarized certification. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. In the case of a continuing delay for the same event or cause only one Claim is necessary. However, separate and distinct written notice is required for each separate event.

4.3.5.2. Weather Delays:

- 4.3.5.2.1. If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated, and had an adverse effect on the scheduled construction activities.
- 4.3.5.2.2. Inclement or adverse weather shall not be a prima facie reason for the granting of an extension of time, and the Contractor shall make every effort to continue work under prevailing conditions. The Owner may grant an extension of time if an unavoidable delay occurs as a result of inclement/severe/adverse weather and such shall then be classified as a "Delay Day". Any and all delay days granted by the Owner are and shall be non-compensable in any manner or form. The Contractor shall comply with the notice requirements concerning instances of inclement/severe/adverse weather before the Owner will consider a time extension. Each day of inclement/severe/adverse weather shall be considered a separate instance or event and as such, shall be subject to the notice requirements.
- 4.3.5.2.3. An "inclement", "severe", or "adverse" weather delay day is defined as a day on which the Contractor is prevented by weather or conditions caused by weather resulting immediately there from, which directly impact the current controlling critical-path operation or operations, and which prevent the Contractor from proceeding with at least 75% of the normal labor and equipment force engaged on such critical path operation or operations for at least 60% of the total daily time being currently spent on the controlling operation or operations.
- 4.3.5.2.4. The Contractor shall consider normal/typical/seasonal weather days and conditions caused by normal/typical/seasonal weather days for the location of the Work in the planning and scheduling of the Work to ensure completion within the Contract Time. No time extensions will be granted for the Contractor's failure to consider and account for such weather days and conditions caused by such weather for the Contract Time in which the Work is to be accomplished.
- 4.3.5.2.5. A "normal", "typical", or "seasonal" weather day shall be defined as weather that can be reasonably anticipated to occur at the location of the Work for each particular month involved in the Contract Time. Each month involved shall not be considered individually as it relates to claims for additional time due to inclement/adverse/severe weather but shall consider the entire Contract Time as it compares to normal/typical/seasonal weather that is reasonably anticipated to occur. Normal/typical/seasonal weather days shall be based upon U.S. National

Weather Service climatic data for the location of the Work or the nearest location where such data is available.

4.3.5.2.6. The Contractor is solely responsible to document, prepare and present all data and justification for claiming a weather delay day. Any and all claims for weather delay days shall be tied directly to the current critical-path operation or operations on the day of the instance or event which shall be delineated and described on the Critical-Path Schedule and shall be provided with any and all claims. The Contractor is solely responsible to indicate and document why the weather delay day(s) claimed are beyond those weather days which are reasonably anticipated to occur for the Contract Time. Incomplete or inaccurate claims, as determined by the Architect/Engineer or Owner, may be returned without consideration or comment.

4.3.5.3. Where the Contractor is prevented from completing any part of the Work with specified durations or phases due to delay beyond the control of both the Owner and the Contractor, an extension of the contract time or phase duration in an equal amount to the time lost due to such delay shall be the Contractor's sole and exclusive remedy for such delay.

4.3.5.4. Delays attributable to and/or within the control of subcontractors and suppliers are deemed to be within the control of the Contractor.

4.3.5.5. In no event shall the Owner be liable to the Contractor, any subcontractor, any supplier, Contractor's surety, or any other person or organization, for damages or costs arising out of or resulting from: (1) delays caused by or within the control of the Contractor which include but are not limited to labor issues or labor strikes on the Project, federal, state, or local jurisdiction enforcement actions related directly to the Contractor's Work (e.g. safety or code violations, etc.); or, (2) delays beyond the control of both parties including but not limited to fires, floods, earthquakes, abnormal weather conditions, acts of God, nationwide material shortages, actions or inaction by utility owners, emergency declarations by federal, state, or local officials enacted in the immediate vicinity of the project, or other contractors performing work for the Owner.

4.3.6. Claims for Consequential Damages

4.3.6.1. The Contractor and Owner waive Claims against each other for consequential damages arising out of or relating to this Contract. This mutual waiver includes:

4.3.6.1.1. damages incurred by the Owner for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and,

4.3.6.1.2. damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, income, and for loss of profit.

4.3.6.2. This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 14. Nothing contained in this waiver of consequential damages shall be deemed to preclude an award of liquidated or actual damages, when applicable, in accordance with the requirements of the Contract Documents.

4.4. RESOLUTION OF CLAIMS, DISPUTES, AND CONTROVERSIES

4.4.1. Decision of Architect/Engineer. Claims, including those alleging an error or omission by the Architect/Engineer, shall be referred initially to the Architect/Engineer for decision. A decision by the Architect/Engineer shall be required as a condition precedent to mediation, arbitration or litigation of all Claims between the Contractor and Owner arising prior to the date of Final Acceptance, unless 30 days have passed after the Claim has been referred to the Architect/Engineer with no decision having been rendered by the Architect/Engineer. The Architect/Engineer will not decide disputes between the Contractor and persons or entities other than the Owner. Any Claim arising out of or related to the Contract, except those already waived in Subparagraphs 4.3.6, 7.2.6, 7.3.8, 9.10.4 and 9.10.5 shall, pending compliance with Subparagraph 4.4.5, be subject to mediation, arbitration, or the institution of

legal or equitable proceedings. Claims waived in Subparagraphs 4.3.6, 7.2.6, 7.3.8, 9.10.4, and 9.10.5 are deemed settled, resolved, and completed.

- 4.4.2. The Architect/Engineer will review Claims and within ten (10) days of the receipt of the Claim take one or more of the following actions: (1) request additional supporting data from the claimant or a response with supporting data from the other party; (2) reject the Claim in whole or in part; (3) approve the Claim; (4) suggest a compromise; or (5) advise the parties that the Architect/Engineer is unable to resolve the Claim if the Architect/Engineer lacks sufficient information to evaluate the merits of the Claim or if the Architect/Engineer concludes that, in the Architect/Engineer's sole discretion, it would be inappropriate for the Architect/Engineer to resolve the Claim.
- 4.4.3. If the Architect/Engineer requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond within ten (10) days after receipt of such request and shall either provide a response on the requested supporting data, advise the Architect/Engineer when the response or supporting data will be furnished, or advise the Architect/Engineer that no supporting data will be furnished. Upon either no response or receipt of the response or supporting data, the Architect/Engineer will either reject or approve the Claim in whole or in part.
- 4.4.4. The Architect/Engineer will approve or reject Claims by written decision, which shall state the reasons therefore and which shall notify the parties of any change in the Contract Sum or Contract Time or both. The approval or rejection of a Claim by the Architect/Engineer shall be final and binding on the parties but subject to mediation and arbitration.
- 4.4.5. When 30 days have passed upon submission of a Claim without decision or action by the Architect/Engineer, or the Architect/Engineer has rendered a decision or taken any of the actions identified in Subparagraph 4.4.2, a demand for arbitration of a Claim covered by such decision or action must be made within 30 days after the date of expiration of Subparagraph 4.4.1 or within 30 days of the Architect/Engineer's decision or action. Failure to demand arbitration within said 30 day period shall result in the Architect/Engineer's decision becoming final and binding upon the Owner and Contractor whenever such decision is rendered.
- 4.4.6. If the Architect/Engineer renders a decision after arbitration proceedings have been initiated, such decision may be entered as evidence but shall not supersede arbitration proceedings unless the decision is acceptable to all parties concerned.
- 4.4.7. Upon receipt of a Claim against the Contractor or at any time thereafter, the Architect/Engineer or the Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, the Architect/Engineer or the Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.
- 4.4.8. A Claim subject to or related to liens or bonds shall be governed by applicable law regarding notices, filing deadlines, and resolution of such Claim prior to any resolution of such Claim by the Architect/Engineer, by mediation, or by arbitration, except for claims made by the Owner against the Contractor's bonds.

4.5. MEDIATION

- 4.5.1. Any Claim arising out of or related to the Contract, except Claims relating to aesthetic effect and except those waived as provided for in Subparagraphs 4.3.6, 7.2.6, 7.3.8, 9.10.4 and 9.10.5 shall, after initial decision by the Architect/Engineer or 30 days after submission of the Claim to the Architect/Engineer, be subject to mediation as a condition precedent to arbitration or the institution of legal or equitable proceedings by either party.
- 4.5.2. The parties shall endeavor to resolve their Claims by mediation which, unless the parties mutually agree otherwise, shall be in accordance with the Construction Industry Mediation Rules of the American Arbitration Association currently in effect and/or those rules specified in the contract documents or separately agreed upon between the parties. Construction Industry Mediation Rule M-2 (filing with AAA) is void. The parties shall mutually agree upon a mediator who shall then take the place of AAA in the Construction Industry Mediation Rules. The parties must mutually agree to use AAA and no filing of a request for mediation shall be made to AAA by either party until such mutual agreement has been made.

Request for mediation shall be filed in writing with the other party to the Contract and with the American Arbitration Association. The request may be made concurrently with the filing of a demand for arbitration but, in such event, mediation shall proceed in advance of arbitration or legal or equitable proceedings, which shall be stayed pending mediation for a period of 60 days from the date of filing, unless stayed for a longer period by agreement of the parties or court order.

- 4.5.3. The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in the place where the Project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof.

4.6. ARBITRATION

- 4.6.1. Any controversy or Claim arising out of or related to this Contract or the breach thereof shall be settled by arbitration in accordance with the Montana Uniform Arbitration Act (MUAA). To the extent it does not conflict with the MUAA, the Construction Industry Arbitration Rules of the American Arbitration Association shall apply except as modified herein. The parties to the arbitration shall bear their own costs and expenses for participating in the arbitration. Costs of the Arbitration panel shall be borne equally between the parties except those costs awarded by the Arbitration panel (including costs for the arbitration itself).
- 4.6.2. Prior to the arbitration hearing all parties to the arbitration may conduct discovery subject to the provisions of Montana Rules of Civil Procedure. The arbitration panel may award actual damages incurred if a party fails to provide full disclosure under any discovery request. If a party claims a right of information privilege protected by law, the party must submit that claim to the arbitration panel for a ruling, before failing to provide information requested under discovery or the arbitration panel may award actual damages.
- 4.6.3. The venue for all arbitration proceedings required by this Contract shall be the seat of the county in which the work occurs or the First Judicial District, Lewis & Clack County, as determined solely by the Owner. Arbitration shall be conducted by a panel comprised of three members with one selected by the Contractor, one selected by the Owner, and one selected by mutual agreement of the Owner and the Contractor.
- 4.6.4. Any Claim arising out of or related to the Contract, except Claims relating to aesthetic effect and except those waived as provided for in Subparagraphs 4.3.6, 7.2.6, 7.3.8, 9.10.4 and 9.10.5, shall, after decision or action by the Architect/Engineer or 30 days after submission of the Claim to the Architect/Engineer, be subject to arbitration provided a demand for arbitration is made within the time frame provided in Subparagraph 4.4.5. If such demand is not made with the specified time frame, the Architect/Engineer's decision or action is final. Prior to arbitration, the parties shall endeavor to resolve disputes by mediation in accordance with the provisions of Paragraph 4.5.
- 4.6.5. Claims not resolved by mediation shall be decided by arbitration which, unless the parties mutually agree otherwise, shall be in accordance with the Construction Industry Arbitration Rules of the American Arbitration Association currently in effect and/or those rules specified in the Contract Documents or separately agreed upon between the parties. Construction Industry Arbitration Rule R-3 (filing with AAA) is void. The parties shall mutually agree upon an arbitrator or arbitrators who shall then take the place of AAA in the Construction Industry Arbitration Rules. The parties must mutually agree to use AAA and no filing of a demand for arbitration shall be made to AAA by either party until such mutual agreement has been made. The demand for arbitration shall be filed in writing with the other party to the Contract and a copy shall be filed with the Architect/Engineer.
- 4.6.6. A demand for arbitration shall be made within the time limits specified in Subparagraphs 4.4.5 and in no event shall it be made after the date when institution of legal or equitable proceedings based on such Claim would be barred by the applicable statute of limitations as determined pursuant to Paragraph 13.7.
- 4.6.7. Pending final resolution of a Claim including arbitration, unless otherwise mutually agreed in writing, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract on Work or amounts not in dispute.
- 4.6.8. **Limitation on Consolidation or Joinder.** Arbitration arising out of or relating to the Contract may include by consolidation or joinder the Architect/Engineer, the Architect/Engineer's employees or consultants,

except by written consent containing specific reference to the Agreement and signed by the Architect/Engineer, Owner, Contractor and any other person or entity sought to be joined. No arbitration shall include, by consolidation or joinder or in any other manner, parties other than the Owner, Architect/Engineer, Contractor, a separate contractor as described in Article 6 and other persons substantially involved in a common question of fact or law whose presence is required if complete relief is to be accorded in arbitration. No person or entity other than the Owner, Architect/Engineer, Contractor or a separate contractor as described in Article 6 shall be included as an original third party or additional third party to an arbitration whose interest or responsibility is insubstantial. The foregoing agreement to arbitrate and other agreements to arbitrate with an additional person or entity duly consented to by parties to the Agreement shall be specifically enforceable under applicable law in any court having jurisdiction thereof.

4.6.9. **Claims and Timely Assertion of Claims.** The party filing a demand for arbitration must assert in the demand all Claims then known to that party on which arbitration is permitted to be demanded.

4.6.10. **Judgment on Final Award.** The award rendered by the arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof. The parties agree that the costs of the arbitrator(s)' compensation and expenses shall be borne equally. The parties further agree that the arbitrator(s) shall have authority to award to either party some or all of the costs and expenses involved, including attorney's fees.

ARTICLE 5 – SUBCONTRACTORS

5.1. DEFINITIONS

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

5.2. AWARD OF SUBCONTRACTS AND OTHER CONTRACTS FOR PORTIONS OF THE WORK

5.2.1. Unless otherwise stated in the Contract Documents or the bidding requirements, the Contractor, as soon as practicable after award of the Contract and in no instance later than (30) days after award of the Contract, shall furnish in writing to the Owner through the Architect/Engineer the names of persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for each principal portion of the Work. The Architect/Engineer will promptly reply to the Contractor in writing stating whether or not the Owner or the Architect/Engineer, after due investigation, has reasonable objection to any such proposed person or entity.

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

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

5.2.4. The Contractor shall not change a Subcontractor, person or entity previously selected if the Owner or Architect/Engineer makes reasonable objection to such substitute. The Contractor shall not change or substitute for a Subcontractor who was required to be listed on the bid without first getting the approval of the Owner.

- 5.2.5. Buy-Safe Montana Provision: Before commencement of each subcontractor's portion of the Work, the Contractor shall obtain each subcontractor's incidence rate, experience modification rate, and loss ratio. The Contractor shall endeavor--but is not required--to use subcontractors whose incidence rate is less than the latest average for non-residential building construction for Montana as established by the Federal Bureau of Labor Statistics for the prior year; whose experience modification rating (EMR) is less than 1.0; and whose loss ratio is less than 100%. Contractor shall require any of its subcontractors who, based on the safety information that the Contractor obtains, have greater-than-average incidence rate, an EMR greater than 1.0, and a loss ratio of more than 100%, to schedule and obtain a Comprehensive Safety Consultation from the Montana Department of Labor & Industry, Employment Relations Division, Safety Bureau before substantial completion of each such subcontractor's portion of the Work. For assistance in obtaining the Comprehensive Safety Consultation, visit <http://erd.dli.mt.gov/safety-health/onsite-consultation>.

5.3. SUBCONTRACTUAL RELATIONS

- 5.3.1. By appropriate agreement, written where legally required for validity, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work, which the Contractor, by these Documents, assumes toward the Owner and Architect/Engineer. Each subcontract agreement shall preserve and protect the rights of the Owner and Architect/Engineer under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the benefit of all rights, remedies and redress against the Contractor that the Contractor, by the Contract Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement which may be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.
- 5.3.2. Upon written request by the Owner, the Contractor shall require its subcontractors to provide to it performance and payment securities for their portion of the Work in the types and form defined in statute (18-2-201 and 18-2-203 MCA) for all sub-contractual agreements.
- 5.3.3. The Contractor shall prepare a Subcontractors' and Suppliers' chart in CSI division format acceptable to the Owner which lists by name, all contact information, job category, and responsibility the Contractor's Subcontractors (at all tiers or levels) and Suppliers with a pecuniary interest in the Project of greater than \$5,000.00. The Contractor shall not enter into any agreement with any subcontractor or supplier to which the Owner raises a timely objection. The Contractor shall promptly inform the Owner in writing of any proposed replacements, the reasons therefore, and the name and qualifications of any proposed replacements. The Owner shall have the right to reject any proposed replacements without cost or claim being made by the Contractor. The chart shall be provided to the Owner at the time of the pre-construction conference but no less than 30 days after award of the Contract.
- 5.3.4. All Contractors and Subcontractors to this contract must comply with all Montana Department of Labor and Industry requirements, regulations, rules, and statutes.
- 5.3.5. In accordance with 39-51-1104 MCA, any Contractor who is or becomes an employer under the provisions of Title 39, Chapter 51 of Montana Code Annotated, who contracts with any Subcontractor who also is or becomes an employer under the provisions of Title 39, Chapter 51 of Montana Code Annotated, shall withhold sufficient money on the contract to guarantee that all taxes, penalties, and interest are paid upon completion of the contract.
- 5.3.5.1. It is the duty of any Subcontractor who is or becomes an employer under the provisions of Title 39, Chapter 51 of Montana Code Annotated, to furnish the Contractor with a certification issued by the Montana Department of Labor and Industry, prior to final payment stating that said

Subcontractor is current and in full compliance with the provisions of Montana Department of Labor and Industry.

5.3.5.2. Failure to comply shall render the Contractor directly liable for all taxes, penalties, and interest due from the Subcontractor, and the Montana Department of Labor and Industry has all of the remedies of collection against the Contractor under the provisions of Title 39, Chapter 51 of Montana Code Annotated, as though the services in question were performed directly for the Contractor.

5.3.6. In compliance with state statutes, the Contractor will have the 1% Gross Receipts Tax withheld from all payments. Each "Public Contractor" includes all Subcontractors with contracts greater than \$5,000 each. The Contractor and all Subcontractors will withhold said 1% from payments made to all Subcontractors with contracts greater than \$5,000.00 and make it payable to the Montana Department of Revenue. The Contractor and all Subcontractors shall also submit documentation of all contracts greater than \$5,000.00 to the Montana Department of Revenue on the Department's prescribed form.

5.3.7. Construction Contractor Registration: All Subcontractors at any tier or level are required to be registered with the Department of Labor and Industry under 39-9-201 and 39-9-204 MCA prior to the Contract being executed by the Owner. Subcontractors shall demonstrate to the Contractor that it has registered or promises that it will register immediately upon notice of award and prior to the commencement of any work.

5.4. CONTINGENT ASSIGNMENT OF SUBCONTRACTS

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

5.4.1.1. assignment is effective only after termination of the Contract by the Owner for cause pursuant to Paragraph 14.2 and only for those subcontract agreements which the Owner accepts by notifying the Subcontractor and Contractor in writing; and,

5.4.1.2. assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

5.4.2. Upon such assignment, if the Work has been suspended for more than 30 days as a result of the Contractor's default, the Subcontractor's compensation shall be equitably adjusted for increases in cost resulting from the suspension. Such adjustment shall be at the expense of the Contractor.

5.4.3. The Contractor shall engage each of its subcontractors and suppliers with written contracts that preserve and protect the rights of the Owner and include the acknowledgement and agreement of each subcontractor and supplier that the Owner is a third-party beneficiary of their sub-contractual and supplier agreements. The Contractor's agreements shall require that in the event of default by the Contractor or termination of the Contractor, and upon request of the Owner, the Contractor's subcontractors and suppliers will perform services for the Owner.

5.4.4. Construction Contractor Registration: All Subcontractors at any tier or level are required to be registered with the Department of Labor and Industry under 39-9-201 and 39-9-204 MCA prior to the Contract being executed by the Owner. Subcontractors shall demonstrate to the Contractor that it has registered or promises that it will register immediately upon notice of award and prior to the commencement of any work.

ARTICLE 6 – CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

6.1. OWNER'S RIGHT TO PERFORM CONSTRUCTION AND TO AWARD SEPARATE CONTRACTS

6.1.1. The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and to award separate contracts in connection with other portions of the Project or other construction or operations on the site under Conditions of the Contract identical or substantially similar to these including those portions related to insurance and waiver of subrogation. If the Contractor claims

that delay or additional cost is involved because of such action by the Owner, the Contractor shall make such Claim as provided in Paragraph 4.3.

- 6.1.2. When separate contracts are awarded for different portions of the Project or other construction or operations on the site, the term "Contractor" in the Contract Documents in each case shall mean the Contractor who executes each separate Owner-Contractor Agreement.
- 6.1.3. The Owner shall provide for coordination of the activities of the Owner's own forces and of each separate contractor with the Work of the Contractor, who shall cooperate with them. The Contractor shall participate with other separate contractors and the Owner in reviewing their construction schedules when directed to do so. The Contractor shall make any revisions to the construction schedule deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, separate contractors and the Owner until subsequently revised.
- 6.1.4. Unless otherwise provided in the Contract Documents, when the Owner performs construction or operations related to the Project with the Owner's own forces, the Owner shall be deemed to be subject to the same obligations and to have the same rights which apply to the Contractor under the Conditions of the Contract, including, without excluding others, those stated in Article 3, this Article 6 and Articles 10, 11 and 12.

6.2. MUTUAL RESPONSIBILITY

- 6.2.1. The Contractor shall afford the Owner and separate contractors reasonable opportunity' for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.
- 6.2.2. If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a separate contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly report to the Architect/Engineer apparent discrepancies or defects in such other construction that would render it unsuitable for such proper execution and results. Failure of the Contractor so to report shall constitute an acknowledgment that the Owner's or separate contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work, except as to defects not then reasonably discoverable.
- 6.2.3. The Owner shall be reimbursed by the Contractor for costs incurred by the Owner which are payable to a separate contractor because of delays, improperly timed activities or defective construction of the Contractor. The Owner shall be responsible to the Contractor for costs incurred by the Contractor because of delays, improperly timed activities, damage to the Work or defective construction of a separate contractor.
- 6.2.4. The Contractor shall promptly remedy damage wrongfully caused by the Contractor to completed or partially completed construction or to property of the Owner or separate contractors as provided in Paragraph 12.2.
- 6.2.5. The Owner and each separate contractor shall have the same responsibilities for cutting and patching as are described for the Contractor in Subparagraph 3.14.

6.3. OWNER'S RIGHT TO CLEAN UP

- 6.3.1. If a dispute arises among the Contractor, separate contractors and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, the Owner may clean up and the Architect/Engineer will determine the responsibility of those involved and allocate the cost accordingly.

ARTICLE 7 – CHANGES IN THE WORK

7.1. GENERAL

- 7.1.1. Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive, or order for a minor change in the Work subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents. Minor changes as ordered by the Architect/Engineer has the definition provided in Paragraph 7.4
- 7.1.2. A Change Order shall be based upon agreement among the Owner, Contractor, and Architect/Engineer; a Construction Change Directive requires agreement by the Owner and Architect/Engineer and may or may not be agreed to by the Contractor; an order for a minor change in the Work may be issued by the Architect/Engineer alone.
- 7.1.3. Changes in the Work shall be performed under applicable provisions of the Contract Documents and the Contractor shall proceed promptly, unless otherwise provided in the Change Order, Construction Change Directive, or order for a minor change in the Work.
- 7.1.4. No act, omission, or course of dealing, shall alter the requirement that Change Orders or Construction Change Directives shall be in writing and signed by the Owner, and that Change Orders and Construction Change Directives are the exclusive method for effecting any adjustment to the Contract. The Contractor understands and agrees that neither the Contract Sum nor the Contract Time can be changed by implication, oral agreement, verbal directive, or unsigned Change Order.

7.2. CHANGE ORDERS

- 7.2.1. A Change Order is a written instrument prepared by the Architect/Engineer and signed by the Owner, Contractor and Architect/Engineer, stating their agreement upon all of the following:
 - 7.2.1.1. change in the Work;
 - 7.2.1.2. the amount of the adjustment, if any, in the Contract Sum; and,
 - 7.2.1.3. the extent of the adjustment, if any, in the Contract Time.
- 7.2.2. The cost or credit to the Owner resulting from a change in the Work shall be determined as follows:
 - 7.2.2.1. Per the limitations of this Subparagraph, plus a 5% allowance for overhead and a 10% allowance for profit. The allowances for overhead and for profit are limited to the percentages as specified herein unless they are determined to be unreasonable by the Architect/Engineer (not the Contractor) per Subparagraph 7.3.9 for each Change Order or Construction Change Directive; or,
 - 7.2.2.2. By one of the methods in Subparagraph 7.3.4, or as determined by the Architect/Engineer per Subparagraph 7.3.9, plus a 5% allowance for overhead and a 10% allowance for profit. The allowances for overhead and for profit are limited to the percentages as specified herein unless they are determined to be unreasonable by the Architect/Engineer (not the Contractor) per Subparagraph 7.3.9 for each Change Order or Construction Change Directive.
 - 7.2.2.3. The Contractor's proposed increase or decrease in cost shall be limited to costs listed in Subparagraph 7.3.9.1 through 7.3.9.5.
- 7.2.3. The Contractor shall not submit any Change Order, response to requested cost proposals, or requested changes which are incomplete and do not contain full breakdown and supporting documentation in the following three areas:
 - 7.2.3.1. Direct costs (only those listed in Subparagraph 7.3.9.1 through 7.3.9.5 are allowable);
 - 7.2.3.2. Indirect costs (limited as a percentage on each Change Order per Supplementary General Conditions, Paragraph 7.2.2); and

- 7.2.3.3. Consequential items (e.g. time extensions, credits, logic, reasonableness, impacts, disruptions, dilution).
- 7.2.4. Any Change Order, responses to requested proposals, or requested changes submitted by the Contractor which, in the opinion of the Architect/Engineer, are incomplete, may be rejected and returned to the Contractor without comment. It is the responsibility of and incumbent upon the Contractor to ensure and confirm that all Change Orders, responses to requested proposals, or requested changes are complete prior to submission.
- 7.2.5. Overhead, applicable to all areas and sections of the Contract Documents, means "Indirect Costs" as referenced in Subparagraph 7.2.3.2. Indirect costs are inclusive of, but not limited to, the following: home office overhead; off-site supervision; home office project management; change order and/or proposal preparation, design, research, negotiation and associated travel; effects of disruption and dilution of management and supervision off-site; time delays; coordination of trades; postage and shipping; and, effective increase in guarantee and warranty durations. Indirect costs applicable to any and all changes in the work, either through Change Order or Construction Change Directive, are limited to the percentage allowance for overhead in Subparagraph 7.2.2.
- 7.2.6. By signature on any Change Order, the Contractor certifies that the signed Change Order is complete and includes all direct costs, indirect costs and consequential items (including additional time, if any) and is free and clear of all claims or disputes (including, but not limited to, claims for additional costs, additional time, disruptions, and/or impacts) in favor of the Contractor, subcontractors, material suppliers, or other persons or entities concerning the signed change order and on all previously contracted Work and does release the Owner from such claims or demands.
- 7.2.7. Any and all changes or adjustments to the Contract Time requested or claimed by the Contractor as a result of a Change Order shall require documentation and justification for the adjustment by a Critical Path Method analysis of the Contractor's most recent Critical Path Schedule in use prior to the change. Changes which affect or concern activities containing float or slack time (i.e. not on the critical path) and which can be accomplished within such float or slack time, shall not result in an increase in the Contract Time.
- 7.2.8. Supervision means on-site, field supervision and not home office overhead, off-site management or off-site supervision.
- 7.2.9. Labor means those persons engaged in construction occupations as defined in Montana Prevailing Wage Rates for Building Construction or Heavy/Highway as bound in the Contract Documents and does not include design, engineering, superintendence, management, on-site field supervision, home office or other off-site management, off-site supervision, office or clerical work.

7.3. CONSTRUCTION CHANGE DIRECTIVES

- 7.3.1. A Construction Change Directive is a written order prepared by the Architect/Engineer directing a change in the Work prior to agreement on adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions or other revisions, the Contract Sum and Contract Time being adjusted accordingly.
- 7.3.2. Any and all changes or adjustments to the Contract Time requested or claimed by the Contractor as a result of a Construction Change Directive, shall require documentation and justification for the adjustment by a Critical Path Method analysis of the Contractor's most recent Critical Path Schedule in use prior to the change. Changes that affect or concern activities containing float or slack time (i.e. not on the critical path) and which can be accomplished within such float or slack time shall not result in an increase in the Contract Time.
- 7.3.3. A Construction Change Directive shall be used in the absence of agreement on the terms of a Change Order.

- 7.3.4. If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:
- 7.3.4.1. mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
 - 7.3.4.2. unit prices stated in the Contract Documents or subsequently agreed upon;
 - 7.3.4.3. cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee;
 - 7.3.4.4. By actual cost as shown by the Contractor's and Subcontractor's itemized invoices; or
 - 7.3.4.5. as provided in Subparagraph 7.3.9.
- 7.3.5. Costs shall be limited to the following: cost of materials, including cost of delivery; cost of labor, including social security, old age and unemployment insurance and fringe benefits under collective bargaining agreements; workers' compensation insurance; bond premiums; and rental value of power tools and equipment.
- 7.3.6. Overhead and profit allowances shall be limited on all Construction Change Directives to those identified in 7.2.2.
- 7.3.7. Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Architect/Engineer of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.
- 7.3.8. A Construction Change Directive signed by the Contractor indicates the agreement of the Contractor therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.
- 7.3.9. If the Contractor does not respond or disagrees with the method for adjustment in the Contract Sum in writing within seven (7) calendar days, the method and the adjustment made shall be determined by the Architect/Engineer on the basis of reasonable expenditures and/or savings of those performing the Work directly attributable to the change including, in the case of an increase in the Contract Sum, plus an allowance for overhead and profit as listed under Subparagraph 7.2.2. In such case, and also under Clause 7.3.4.3, the Contractor shall keep and present, in such form as the Architect/Engineer may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Subparagraph 7.3.9 shall be limited to the following:
- 7.3.9.1. costs of labor, including social security, old age and unemployment insurance, fringe benefits required by agreement or custom, and workers' compensation insurance as determined by the Prevailing Wage Schedules referenced in the Contract Documents;
 - 7.3.9.2. costs of materials, supplies and equipment, including cost of transportation, whether incorporated or consumed;
 - 7.3.9.3. rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;
 - 7.3.9.4. costs of premiums for all bonds and insurance, permit fees, and sales, use or similar taxes related to the Work; and
 - 7.3.9.5. additional costs of field supervision and field office personnel directly attributable to the change.
- 7.3.10. The amount of credit to be allowed by the Contractor to the Owner for a deletion or change which results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Architect/Engineer. When both additions and credits covering related Work or substitutions are involved in a change, the

allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

- 7.3.11. Pending final determination of the total cost of a Construction Change Directive to the Owner, amounts not in dispute for such changes in the Work shall be included in Applications for Payment accompanied by a Change Order indicating the parties' agreement with part or all of such costs. For any portion of such cost that remains in dispute, the Architect/Engineer will make an interim determination for purposes of monthly certification for payment for those costs. That determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a claim in accordance with Article 4.
- 7.3.12. When the Owner and Contractor agree with the determination made by the Architect/Engineer concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and shall be recorded by preparation and execution of an appropriate Change Order.

7.4. MINOR CHANGES IN THE WORK

- 7.4.1. The Architect/Engineer will have authority to order minor changes in the Work not involving adjustment in the Contract Sum or extension of the Contract Time and not inconsistent with the intent of the Contract Documents. Such changes shall be effected by written order and shall be binding on the Owner and Contractor. The Contractor shall carry out such written orders promptly.

ARTICLE 8 – TIME

8.1. DEFINITIONS

- 8.1.1. Time is of the essence in performance, coordination, and completion of the Work contemplated herein. The Owner may suffer damages if the Work is not completed as specified herein. When any duration or time period is referred to in the Contract Documents by days, the first day shall be determined as the day following the current day of any event or notice starting a specified duration.
- 8.1.2. Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work.
- 8.1.3. The date of commencement of the Work is the date established in the NOTICE TO PROCEED AS ISSUED BY THE OWNER.
- 8.1.4. The date the Contractor reaches Substantial Completion is the date certified by the Architect/Engineer in accordance with Paragraph 9.8.
- 8.1.5. The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.
- 8.1.6. Liquidated Damages. The Owner may suffer loss if the project is not substantially complete on the date set forth in the contract documents. The Contractor and his surety shall be liable for and shall pay to the Owner the sums hereinafter stipulated as liquidated damages for each calendar day of delay until the work is substantially complete: **See Instructions to Bidders.**
- 8.1.7. The Contractor shall not be charged liquidated or actual damages when delay in completion of the Work is due to:
 - 8.1.7.1. Any preference, priority or allocation order issued by the government;
 - 8.1.7.2. Unforeseeable cause beyond the control and without the fault or negligence of the Contractor, such as acts of God or of the public enemy, fires, floods, epidemics, quarantine restrictions, freight embargoes, and unusually severe weather. All such occurrences resulting in delay must be documented and approved by Change Order; or,

8.1.7.3. Any delays of Subcontractors or suppliers occasioned by any of the causes specified in 8.1.7.1 and 8.1.7.2 of this article.

8.1.8. The Contractor is completely obligated and responsible to provide written notice of each day of delay as provided for in Paragraph 4.3.

8.1.9. Contract Time. All work shall reach Substantial Completion by: **See Instructions to Bidders.** The Owner will issue a written NOTICE TO PROCEED and finalized contract.

8.2. PROGRESS AND COMPLETION

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

8.2.2. The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, prematurely commence operations on the site or elsewhere prior to the date on the Notice to Proceed and in no case prior to the effective date of insurance required by Article 11 to be furnished by the Contractor. The date of commencement of the Work shall not be changed by the effective date of such insurance.

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

8.2.4. If the Contractor falls behind the latest construction schedule by more than 14 calendar days through its own actions or inaction, neglect, inexperience, lack of oversight and management of the Work including that of any Subcontractors, written notice to the Owner and Architect/Engineer shall be provided within three (3) days with explanation of how the Contractor intends to get back on schedule. Response to getting back on schedule consists of providing a sufficient number of qualified workers and/or proper materials or an acceptably reorganized schedule to regain the lost time in a manner acceptable to the Owner.

8.3. DELAYS AND EXTENSIONS OF TIME

8.3.1. If the Contractor is delayed at any time in the commencement or progress of the Work by an act or neglect of the Owner or Architect/Engineer, or of an employee of either, or of a separate contractor employed by the Owner, or by changes ordered in the Work, or by fire, unusual delay in deliveries, unavoidable casualties or other causes beyond the Contractor's control, or by delay authorized by the Owner pending mediation and arbitration, or by other causes which the Architect/Engineer determines may justify delay, then the Contract Time shall be extended by Change Order for such reasonable time as the Architect/Engineer may determine.

8.3.2. Claims relating to time shall be made in accordance with applicable provisions of Paragraph 4.3.

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

PAYMENTS AND COMPLETION

9.1. CONTRACT SUM

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

9.2. SCHEDULE OF VALUES

9.2.1. Before the first Application for Payment, the Contractor shall submit to the Architect/Engineer a schedule of values allocated to various portions of the Work, prepared in such form and supported by such data to substantiate its accuracy as the Architect/Engineer may require. This schedule, unless objected to by the Architect/Engineer, shall be used as a basis for reviewing the Contractor's Applications for Payment.

9.3. APPLICATIONS FOR PAYMENT

- 9.3.1. The Contractor shall submit to the Architect/Engineer an itemized Application for Payment for operations completed in accordance with the Schedule of Values. Such application shall be signed and supported by such data substantiating the Contractor's right to payment as the Owner or Architect/Engineer may require, such as copies of requisitions from Subcontractors and material suppliers, and reflecting retainage if provided for in the Contract Documents.
- 9.3.2. NOTICE OF APPROVAL OF PAYMENT REQUEST PROVISION. Per Title 28, Chapter 2, Part 21, this contract allows the Owner to change the number of days to approve a Contractor's payment request. This contract allows the Owner to approve the Contractor's payment request within thirty-five (35) calendar days after it is received by the Owner without being subject to the accrual of interest.
- 9.3.3. As provided in Subparagraph 7.3.11, such applications may include requests for payment on account of changes in the Work which have been properly authorized by Construction Change Directives, or by interim determinations of the Architect/Engineer, but not yet included in Change Orders.
- 9.3.4. Applications for payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay to a Subcontractor or material supplier.
- 9.3.5. Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage and transportation to the site for such materials and equipment stored off the site.
- 9.3.6. The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information and belief, be free and clear of liens, claims, security interests or encumbrances in favor of the Contractor, Subcontractors, material suppliers, or other persons or entities making a claim by reason of having provided labor, materials and equipment relating to the Work.
- 9.3.7. Until the work is complete, the Owner will pay 95% of the amount due the Contractor on account of progress payments.
 - 9.3.7.1. If the Work and its progress are not in accordance with all or any part, piece, or portion of the Contract Documents, the Owner may, at its sole discretion and without claim by the Contractor, increase the amount held as retainage to whatever level deemed necessary to effectuate performance and progress of the Work, for anticipated repairs, warranties or completion of the Work by the Contractor or through the letting of other contracts. The Contractor will not be entitled to additional costs, expenses, fees, time, and such like, in the event the Owner increases the amount held as retainage due to non-compliance and/or non-performance with all or any part, piece, or portion of the Contract Documents.
 - 9.3.7.2. Prior to the first application for payment, the Contractor shall submit the following information on the appropriate forms:
 - 9.3.7.2.1. Schedule of Amounts for Contract Payment (Form 100): This form shall contain a breakdown of the labor, material and other costs associated with the various portions of the work and shall be the basis for the progress payments to the Contractor. The use of electronic method shall be in the Owner's format.
 - 9.3.7.2.2. Project/Progress Schedule: If no Schedule (or revised Schedule) is provided with each and every Periodic Estimates for Partial Payment, the Architect/Engineer and/or Owner may return the pay request, or hold it, and may choose not pay for

any portion of the Work until the appropriate Schedule, indicating all changes, revisions and updates, is provided. No claim for additional costs or interests will be made by the Contractor or any subcontractor on account of holding or non-payment of the Periodic Estimate for Partial Payment request.

9.3.7.3. Progress Payments

9.3.7.3.1. Periodic Estimates for Partial Payment shall be on a form provided by the Owner (Form 101) and submitted to the Architect/Engineer for payment by the Owner. Payment shall be requested for the labor and material incorporated in the work to date and for materials suitably stored, less the aggregate of previous payments, the retainage, and the 1% gross receipts tax.

9.3.7.3.2. The Contractor, by submission of any partial pay request, certifies that every request for partial payment is correct, true and just in all respects and that payment or credit had not previously been received. The Contractor further warrants and certifies, by submission of any partial pay request, that all previous work for which payment has been received is free and clear of all liens, disputes, claims, security interests, encumbrances, or causes of action of any type or kind in favor of the Contractor, subcontractors, material suppliers or other persons or entities and does release the Owner from such.

9.3.7.3.3. Progress payments do not constitute official acceptance of any portion of the work or materials whether stored on or off-site.

9.3.7.3.4. In compliance with 15-50-206 MCA, the Contractor will have 1% of his gross receipts withheld by the Owner from all payments due. Each subcontractor who performs work greater than \$5,000 shall have 1% of its gross receipts withheld by the Contractor. The Contractor shall notify the Department of Revenue on the department's prescribed forms.

9.3.7.4. The Contractor may submit obligations/securities in a form specified in 18-1-301 Montana Code Annotated (MCA) to be held by a Financial Institution in lieu of retainage by the Owner. The Owner will establish the amount that would otherwise be held as retainage. Should the Contractor choose to submit obligations/securities in lieu of retainage, the Owner will require the Financial Institution to execute the Owner's "Account Agreement for Deposit of Obligations Other Than Retainage" (Form 120) prior to submission of any obligations/securities in accordance with 18-1-302 MCA. The Contractor must extend the opportunity to participate in all obligations/securities in lieu of retainage on a pro rata basis to all subcontractors involved in the project and shall be solely responsible for the management and administration of same. The Owner assumes no liability or responsibility from or to the Contractor or Subcontractors regarding the latter's participation.

9.3.7.5. The Contractor shall maintain a monthly billing cycle.

9.4. CERTIFICATES FOR PAYMENT

9.4.1. The Architect/Engineer will, within seven days after receipt of the Contractor's Application for Payment, either issue to the Owner a Certificate for Payment, with a copy to the Contractor, for such amount as the Architect/Engineer determines is properly due, or notify the Contractor and Owner in writing of the Architect/Engineer's reasons for withholding certification in whole or in part as provided in Subparagraph 9.5.1. For the purposes of this paragraph regarding certification of payment, electronic mail and/or notes provided through the use of an electronic approval system shall constitute written notice.

9.4.2. The issuance of a Certificate for Payment will constitute a representation by the Architect/Engineer to the Owner, based on the Architect/Engineer's evaluation of the Work and the data comprising the Application for Payment, that the Work has progressed to the point indicated and that, to the best of the Architect/Engineer's knowledge, information and belief, the quality of the Work is in accordance with the Contract Documents. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion and to specific qualifications expressed by the Architect/Engineer. The issuance of a Certificate for Payment will further constitute a representation that the Contractor is entitled to payment in the amount certified.

However, the issuance of a Certificate for Payment will not be a representation that the Architect/Engineer has: (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work; (2) reviewed construction means, methods, techniques, sequences or procedures; (3) reviewed copies of requisitions received from Subcontractors and material suppliers and other data requested by the Owner to substantiate the Contractor's right to payment; or, (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

9.5. DECISIONS TO WITHHOLD CERTIFICATION

9.5.1. The Architect/Engineer may withhold or reject a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect/Engineer's opinion the representations to the Owner required by Subparagraph 9.4.2 cannot be made. If the Architect/Engineer is unable to certify payment in the amount of the Application, the Architect/Engineer will notify the Contractor and Owner as provided in Subparagraph 9.4.1. If the Contractor and Architect/Engineer cannot agree on a revised amount, the Architect/Engineer will promptly issue a Certificate for Payment for the amount for which the Architect/Engineer is able to make such representations to the Owner. The Architect/Engineer may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect/Engineer's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Subparagraph 3.3.4, because of:

9.5.1.1. defective Work not remedied;

9.5.1.2. third party claims filed or reasonable evidence indicating probable filing of such claims unless security acceptable to the Owner is provided by the Contractor;

9.5.1.3. failure of the Contractor to make payments properly to Subcontractors or for labor, materials or equipment;

9.5.1.4. reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;

9.5.1.5. damage to the Owner or another contractor;

9.5.1.6. reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or,

9.5.1.7. persistent failure to carry out the Work in accordance with the Contract Documents.

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

9.5.3. Owner's Right to Refuse Payment: The Architect/Engineer's approval, or partial approval, of the Contractor's request for payment shall not preclude or prevent the Owner from exercising any of its remedies under this Contract. The Owner shall have right to refuse to make payment(s) to the Contractor due to:

9.5.3.1. the Contractor's failure to perform the Work in compliance with the Contract Documents;

9.5.3.2. the Contractor's failure to correct any defective or damaged Work;

9.5.3.3. the Contractor's failure to accurately represent the Work performed in the pay request;

9.5.3.4. the Contractor's performance of its Work at a rate or in a manner that, in the Owner's opinion, is likely to result in the Work, or any portion thereof, to be delayed;

9.5.3.5. the Contractor's failure to use funds previously paid to it by the Owner to pay for the Contractor's Work-related obligations including, but not limited to, subcontractors and suppliers on this Project;

- 9.5.3.6. claims made, or anticipated by the Owner to be made, against the Owner or its property;
- 9.5.3.7. inclusion in the pay request of any amounts in dispute or part of a claim;
- 9.5.3.8. Damage or loss caused by the Contractor, including its subcontractors and suppliers; or,
- 9.5.3.9. The Contractor's failure or refusal to perform its obligations to the Owner.

9.6. PROGRESS PAYMENTS

- 9.6.1. After the Architect/Engineer has issued a Certificate for Payment, the Owner shall make payment in the manner and within the time provided in the Contract Documents or the Owner may take any action the Owner deems necessary under Subparagraph 9.5.3.
- 9.6.2. The Contractor shall promptly pay each Subcontractor in accordance with Title 28, Chapter 2, Part 21, upon receipt of payment from the Owner, out of the amount paid to the Contractor on account of such Subcontractor's portion of the Work, the amount to which said Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of such Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner.
- 9.6.3. The Contractor is prohibited from holding higher amounts in retainage on any Subcontractor than the Owner is holding from the Contractor.
- 9.6.4. The Architect/Engineer will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Architect/Engineer and Owner on account of portions of the Work done by such Subcontractor.
- 9.6.5. Neither the Owner nor Architect/Engineer shall have an obligation to pay, or to see to the payment of, money to a Subcontractor except as may otherwise be required by law.
- 9.6.6. Payment to material suppliers shall be treated in a manner similar to that provided in Subparagraphs 9.6.2, 9.6.3, 9.6.4, and 9.6.5.
- 9.6.7. A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.
- 9.6.8. Unless the Contractor provides the Owner with a payment bond in the full penal sum of the Contract Sum, payments received by the Contractor for Work properly performed by Subcontractors and suppliers shall be held by the Contractor for those Subcontractors or suppliers who performed Work or furnished materials, or both, under contract with the Contractor for which payment was made by the Owner. Nothing contained herein shall require money to be placed in a separate account and not commingled with money of the Contractor, shall create any fiduciary liability or tort liability on the part of the Contractor for breach of trust or shall entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision.

9.7. FAILURE OF PAYMENT

- 9.7.1. If the Owner does not approve payment to the Contractor within thirty-five (35) calendar days after the receipt of a certified Application for Payment, then the Contractor may, upon seven additional days' written notice to the Owner and Architect/Engineer, suspend the Work until payment of the amount owing has been received. Nothing in the Subparagraph shall limit the Owner's rights and options as provided in Subparagraph 9.5.3. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shut-down, delay and start-up, plus interest as provided for in the Contract Documents.

9.8. SUBSTANTIAL COMPLETION

- 9.8.1. Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use.
- 9.8.2. When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Architect/Engineer a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.
- 9.8.3. Upon receipt of the Contractor's list, the Architect/Engineer will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Architect/Engineer's Inspection discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect/Engineer. In such case, the Contractor shall then submit a request for another inspection by the Architect/Engineer to determine Substantial Completion.
- 9.8.4. The Contractor shall ensure the project is substantially complete prior to requesting any inspection by the Architect/Engineer so that no more than one (1) inspection is necessary to determine Substantial Completion for all or any portion of the Work. If the Contractor does not perform adequate inspections to develop a comprehensive list as required in Subparagraph 9.8.2 and does not complete or correct such items upon discovery or notification, the Contractor shall be responsible and pay for the costs of the Architect/Engineer's additional inspections to determine Substantial Completion.
- 9.8.5. When the Work or designated portion thereof is substantially complete, the Architect/Engineer will prepare a Certificate of Substantial Completion which shall establish the date of Substantial Completion and which shall establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance. After issuance of the Certificate of Substantial Completion, the Contractor shall finish and complete all remaining items within thirty (30) calendar days of the date on the Certificate. The Architect/Engineer shall identify and fix the time for completion of specific items which may be excluded from the thirty (30) calendar day time limit. Failure to complete any items within the specified time frames may be deemed by the Owner as default of the contract on the part of the Contractor.
- 9.8.6. The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in such Certificate. Upon such acceptance and consent of surety if there are claims or past payment issues, the Owner shall make payment of retainage applying to such Work or designated portion thereof. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents.

9.9. PARTIAL OCCUPANCY OR USE

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

- 9.9.2. Immediately prior to such partial occupancy or use, the Owner, Contractor and Architect/Engineer shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work. Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.
- 9.9.3. Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

9.10. FINAL COMPLETION AND FINAL PAYMENT

- 9.10.1. Upon receipt of written notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect/Engineer will promptly make such inspection and, when the Architect/Engineer finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect/Engineer will approve the Contractor's final Certificate for Payment stating that to the best of the Architect/Engineer's knowledge, information and belief, and on the basis of the Architect/Engineer's on-site visits and inspections, the Work has been completed in accordance with terms and conditions of the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect/Engineer's signature on the Contractor's final Certificate for Payment will constitute a further representation that conditions listed in Subparagraph 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.
- 9.10.2. Neither final payment nor any remaining retainage shall become due until the Contractor submits to the Architect/Engineer:
 - 9.10.2.1. completed Contractor's Affidavit of Completion, Payment of Debts and Claims, and Release of Liens (Form 106) that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied;
 - 9.10.2.2. a certificate 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 the Owner;
 - 9.10.2.3. a written statement that the Contractor knows of no substantial reason that the insurance will not be renewable to cover the period required by the Contract Documents
 - 9.10.2.4. Consent of Surety Company to Final Payment (Form 103); and,
 - 9.10.2.5. if required by the 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 the Owner.
- 9.10.3. The Contractor and his surety accepts and assumes responsibility, liability, and costs for and agrees to defend and hold harmless the Owner for and against any and all actions as a result of the Owner making final payment.
- 9.10.4. By submitting any Application for Payment to the Architect/Engineer the Contractor and his surety certify and declare that all bills for materials, supplies, utilities and for all other things furnished or caused to be furnished by the Contractor and all Subcontractors and used in the execution of the Contract will be fully paid upon receipt of Final Payment and that there are no unpaid obligations, liens, claims, security interests, encumbrances, liabilities and/or demands of State Agencies, subcontractors, suppliers, mechanics, laborers or any others resulting from or arising out of any work done, caused to be done or ordered to be done by the Contractor under the contract.
- 9.10.5. In consideration of the prior payments and the final payment made and all payments made for authorized changes, the Contractor releases and forever discharges the Owner from any and all obligations, liens, claims, security interests, encumbrances and/or liabilities arising by virtue of the contract and authorized

changes between the parties, either verbal or in writing, and any and all claims and demands of every kind and character whatsoever against the Owner, arising out of or in any way relating to the contract and authorized changes.

- 9.10.6. The date of Final Payment by the Owner shall constitute Final Acceptance of the Work. The determining date for the expiration of the warranty period shall be as specified in Paragraphs 3.5 and 12.2.2.
- 9.10.7. If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting final completion, and the Architect/Engineer so confirms, the Owner shall, upon application by the Contractor and certification by the Architect/Engineer, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance for Work not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of surety to payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Architect/Engineer prior to certification of such payment. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of claims.
- 9.10.8. The making of final payment shall constitute a waiver of Claims by the Owner except those arising from:
- 9.10.8.1. liens, Claims, security interests or encumbrances arising out of the Contract and unsettled;
- 9.10.8.2. failure of the Work to comply with the requirements of the Contract Documents; or,
- 9.10.8.3. terms of special warranties required by the Contract Documents.
- 9.10.9. Acceptance of final payment by the Contractor, a Subcontractor, or material supplier, shall constitute a waiver of any and all obligations, liens, claims, security interests, encumbrances and/or liabilities against the Owner except those previously made in writing per the requirements of Paragraph 4.3 and as yet unsettled at the time of submission of the final Application for Payment.
- 9.10.10. The Owner's issuance of Final Payment does not constitute a waiver or release of any kind regarding any past, current, or future claim the Owner may have against the Contractor and/or the surety.

ARTICLE 10 – PROTECTION OF PERSONS AND PROPERTY

10.1. SAFETY

- 10.1.1. **Importance of Safety.** The Contractor and all Subcontractors (at any tier or level) recognize that safety is paramount at all times. The Contractor shall perform the work in a safe manner with the highest regard for safety of its employees and all other individuals and property at the work site. Contractor shall maintain its tools, equipment, and vehicles in a safe operating condition and take all other actions necessary to provide a safe working environment for performance of work required under this Contract. The Contractor is solely responsible for the means, methods, techniques, sequences and procedures for coordinating and constructing the Work, including all site safety, safety precautions, safety programs, and safety compliance with OSHA and all other governing bodies.
- 10.1.2. **Particular Safeguards.** (a) The Contractor shall erect and maintain, as required by Paragraphs 10.1.1 and 10.1.3, safeguards for safety and protection, including posting danger signs and other warnings against hazards, installing suitable barriers and lighting, promulgating safety regulations, and providing notification to all parties who may be impacted by the Contractor's operations. (b) When use or storage of explosives or other Hazardous Materials/Substances (defined below) or equipment are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel. (c) The Contractor shall not encumber or load or permit any part of the construction site to be encumbered or loaded so as to endanger the safety of any person(s).
- 10.1.3. **Compliance with Safety Laws.** Contractor represents and warrants to Owner that it knows and understands all federal, state and local safety statutes, rules, and regulations (Laws) related to the work under this Contract. Contractor shall comply with these Laws. Contractor shall keep all material data safety sheets on site and available at all times.

- 10.1.4. **Remedy property damage.** The Contractor shall promptly remedy damage and loss to property caused in whole or in part by the Contractor, a Subcontractor of any tier or level, or anyone employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Paragraph 3.18.
- 10.1.5. **Designation of Safety Representative.** Unless the Contractor designates, in writing to the Owner and the Architect/Engineer, another responsible member of the Contractor's organization as the Safety Representative, the Contractor's superintendent is the Safety Representative. The Safety Representative is defined as that member of the Contractor's organization responsible for all safety under this Contract.
- 10.1.6. **Release/Indemnity of Owner and Architect/Engineer.** The Contractor agrees that the Owner and Architect/Engineer are not responsible for safety at the work site and releases them from all obligations and liability regarding safety at the work site. The Contractor shall indemnify and defend the Owner and the Architect/Engineer against and from all claims, liabilities, fines, penalties, orders, causes of action, judgments, losses, costs and expenses (including but not limited to court costs and reasonable attorney fees), arising from injuries and death to any persons and damage to real and personal property arising from, in connection with, or incidental to Contractor's safety responsibilities under this Contract.

10.2. HAZARDOUS MATERIALS/SUBSTANCES

- 10.2.1. "Hazardous Materials/Substances" means any substance: (a) the presence of which requires investigation, or remediation under any federal, state or local statute, rule, regulation, ordinance, order, policy or common law; (b) that is or becomes defined as "hazardous waste," "hazardous substance," pollutant, or contaminant under any federal, state or local statute, rule, regulation, or ordinance or amendments thereto; (c) that is toxic, explosive, corrosive flammable, or otherwise hazardous and is or becomes regulated by any government authority, agency, board, commission or instrumentality of the United States, the state of Montana or any political subdivision thereof; (d) gasoline, diesel fuel or other petroleum hydrocarbons; (e) containing contains polychlorinated biphenyls (PCBs) or asbestos; or (f) the presence of which causes or threatens to cause a nuisance or trespass on the work site or adjacent property.
- 10.2.2. The Contractor is solely responsible for all compliance with all regulations, requirements, and procedures governing Hazardous Materials/Substances at the Work Site or that Contractor brings on the site. The Contractor is solely responsible for remediation, costs, damages, loss, and/or expenses for all Hazardous Materials/Substances brought to the site. The Contractor shall not and is strictly prohibited from purchasing and/or installing any asbestos-containing materials or products as part of the Work. Should the Contractor do so, the Contractor shall be solely responsible for the immediate remediation and all costs, damages, loss, and/or expenses per Paragraphs 10.1.6, 10.2.2, 10.2.3, and 10.2.4.
- 10.2.3. If the Contractor encounters Hazardous Materials/Substances during the course of the Work, whether or not identified in the Contract Documents, Work, the Contractor agrees that:
- 10.2.3.1. Encountering any Hazardous Materials/Substances during performance of the Work does not necessarily mean a change in conditions has occurred, nor is it evidence that the Contractor is due additional Contract Time or an increase in the Contract Sum. If encountering Hazardous Materials/Substances is determined to be a change in conditions to the Contract Documents, Paragraph 4.3 and Article 7 apply in determining any additional compensation or extension of time claimed by the Contractor.
- 10.2.3.2. The Contractor is solely responsible for securing the Work in accordance with this Article 10 involving any Hazardous Materials/Substances against unlawful, unregulated, or improper intrusion, disturbance, or removal. The Contractor shall implement protections and take protective actions throughout the performance of the Work to prevent exposure to workers, occupants, and contamination of the site or area.
- 10.2.3.3. If the Contractor is unable to or fails to properly secure the Work against unlawful, unregulated, or improper intrusion, disturbance, or removal of Hazardous Materials/Substances, the Contractor shall immediately implement protections and take protective actions, up to and

including stopping Work in the area or on the item affected, to prevent exposure to workers, occupants, and contamination of the site or area. The Contractor shall immediately notify the Owner and Architect in writing giving details of the failure and the corrective actions taken. If the condition is an emergency and notice cannot be provided in writing, then Contractor shall orally and immediately notify the Owner and Architect/Engineer of the condition followed by a full written explanation. In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury or loss.

10.2.3.4. If the Contractor notifies the Owner and takes precautions in accordance with this Article 10 upon encountering materials/substances suspected of containing asbestos or polychlorinated biphenyls that are unidentified in the Contract Documents, the Owner shall verify if the unidentified material or substance contains asbestos or polychlorinated biphenyls and shall arrange for the removal or other measures as necessary to allow the Contractor to proceed with the Work. The Contract Time may be extended as appropriate if the Work affected is on the critical path and the Contract Sum shall be increased in the amount of the Contractor's reasonable additional costs as provided in Article 7. Should the Contractor fail to notify the Owner upon encountering asbestos, polychlorinated biphenyls, or materials/substances suspected of containing asbestos or polychlorinated biphenyls, that are unidentified in the Contract Documents, the Contractor is solely responsible for all mitigation in accordance with Paragraphs 10.1.6, 10.2.2, 10.2.3, and 10.2.4.

10.2.4. The Contractor shall indemnify, hold harmless, and defend the Owner from and against all claims, liabilities, fines, penalties, orders, causes of action, judgments, losses, costs and expenses, including but not limited to court costs and reasonable attorneys' fees, arising from, in connection with, or incidental to the Contractor's handling, disposal, encountering, or release of Hazardous Materials/Substances.

10.3. UTILITIES

10.3.1. Underground Utilities: Buried utilities, including, but not limited to, electricity, gas, steam, air, water, telephone, sewer, irrigation, broadband coaxial computer cable, and fiber optic cables are very vulnerable and damage could result in loss of service. The telephone, broadband and fiber optic cables are especially sensitive and the slightest damage to these components will result in disruption of the operations of the campus.

10.3.2. "One Call" must be notified by phone and in writing at least 72 hours (3 business days) prior to digging to arrange and assist in the location of buried utilities in the field. (Dial 811). The Contractor shall mark the boundary of the work area. The boundary area shall be indicated with white paint and white flags. In winter, pink paint and flags will be accepted.

10.3.3. After buried utilities have been located, the Contractor shall be responsible for any utilities damaged while digging. Such responsibility shall include all necessary care including hand digging. Contractor's responsibility shall also include maintaining markings after initial locate. The area for such responsibility, unless otherwise indicated, shall extend 24 inches to either side of the marked center line of a buried utility line.

10.3.4. The Contractor's responsibility shall include repair or replacement of damaged utilities. The Contractor will also be responsible for all costs associated with reterminations and recertification.

10.3.5. Any buried utilities exposed by the operations of the Contractor shall be marked on the plans and adequately protected by the Contractor. If any buried utilities not located are exposed, the Contractor shall immediately contact the Owner and the Architect/Engineer. If, after exposing an unlocated buried utility, the Contractor continues digging without notifying Owner and Architect/Engineer and further damages the utility, the Contractor will be fully and solely responsible.

10.3.6. Damage to irrigation systems during seasons of no irrigation that are not immediately and adequately repaired and tested will require the Contractor to return when the system is in service to complete the repair.

10.3.7. In the event of a planned interruption of any existing utility service, the Contractor shall make arrangements with Owner at least 72 hours (3 business days) in advance. Shutdowns of the broadband

or fiber optic cables will normally require 5 working days' notice to the Owner. The Contractor shall bear all costs associated with the interruptions and restorations of service.

ARTICLE 11 - INSURANCE AND BONDS

11.1. CONTRACTOR'S LIABILITY INSURANCE

- 11.1.1. The Contractor shall purchase from and maintain in a company or companies lawfully authorized to do business in the State of Montana with a rating no less than "A-", such insurance as will protect the Contractor from claims set forth below which may arise out of or result from the Contractor's operations under the Contract and for which the Contractor may be legally liable, whether such operations be by the Contractor or by a Subcontractor or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable:
- 11.1.1.1. claims under workers' compensation, disability benefit and other similar employee benefit acts which are applicable to the Work to be performed;
 - 11.1.1.2. claims for damages because of bodily injury, occupational sickness or disease, or death of the Contractor's employees;
 - 11.1.1.3. claims for damages because of bodily injury, sickness or disease, or death of any person other than the Contractor's employees;
 - 11.1.1.4. claims for damages insured by usual personal injury liability coverage;
 - 11.1.1.5. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property, including loss of use resulting there from;
 - 11.1.1.6. claims for damages because of bodily injury, death of a person or property damage arising out of ownership, maintenance or use of a motor vehicle;
 - 11.1.1.7. claims for bodily injury or property damage arising out of completed operations; and,
 - 11.1.1.8. claims involving contractual liability insurance applicable to the Contractor's obligations under Paragraph 3.18.
- 11.1.2. The insurance required by Subparagraph 11.1.1 shall be written for not less than limits of liability specified in the Contract Documents or required by law, whichever coverage is greater. Coverages, whether written on an occurrence or claims-made basis, shall be maintained without interruption from date of commencement of the Work until termination of any coverage required to be maintained after final payment.
- 11.1.3. Certificates of insurance acceptable to the Owner shall be filed with the Owner prior to commencement of the Work. These certificates and the insurance policies required by this Paragraph 11.1 shall contain a provision that coverages afforded under the policies will not be canceled or allowed to expire at any time prior to Final Acceptance and then not until at least 30 days' prior written notice has been given to the Owner. If any of the foregoing insurance coverages are required to remain in force after final payment, an additional certificate evidencing continuation of such coverage shall be submitted with the final Application for Payment as required by Subparagraph 9.10.2. Information concerning reduction of coverage on account of revised limits or claims paid under the General Aggregate, or both, shall be furnished by the Contractor with reasonable promptness in accordance with the Contractor's information and belief.
- 11.1.4. At the request of the Owner, the Contractor shall provide copies of all insurance policies to the Owner.

11.2. INSURANCE, GENERAL REQUIREMENTS

- 11.2.1. The Contractor shall maintain for the duration of the contract, at its cost and expense, insurance against claims for injuries to persons or damages to property, including contractual liability, which may arise from or in connection with the performance of the Work by the Contractor, its agents, employees,

representatives, assigns, or subcontractors. The Contractor is responsible for all deductibles regardless of policy or level of coverage. The Owner reserves the right to demand, and the Contractor agrees to provide, copies of any and all policies at any time.

- 11.2.2. **Hold Harmless and Indemnification:** The Contractor shall protect, defend, and save the state, its elected and appointed officials, agents, and employees, while acting within the scope of their duties as such, harmless from and against all claims, liabilities, demands, causes of action, and judgments whatsoever (including the cost of defense and reasonable attorney fees): 1) arising in favor of or asserted by third parties on account of damage to property, personal injury, or death which injury, death, or damage; or, 2) arising out of or resulting from performance or failure to perform, or omissions of services, or in any way results from the negligent acts or omissions of the Contractor, its agents, agents, or subcontractors.
- 11.2.3. **Contractor's Insurance:** insurance required under all sections herein shall be in effect for the duration of the contract that extends through the warranty period. Insurance required herein shall be provided by insurance policies issued only by insurance companies currently authorized to do business in the state of Montana. No Contractor or Sub-contractor shall commence any Work under this contract until all required insurance has been obtained. During the term of this contract, the Contractor shall, not less than thirty days prior to the expiration date of any policy for which a certificate of insurance is required, deliver to the Owner a certificate of insurance with respect to the renewal insurance policy. The Contractor shall furnish one copy of insurance certificates of insurance herein required, which shall specifically set forth evidence of all coverage required by these contract documents and which shall be signed by authorized representatives of the insurance company or companies evidencing that insurance as required herein is in force and will not be canceled, limited or restricted without thirty days' written notice by certified mail to the contractor and the Owner. The Contractor shall furnish to the Owner copies of any endorsements that are subsequently issued amending coverage or limits. Additionally, all certificates shall include the project name and A/E project number.
- 11.2.4. **Certificates of Insurance and Endorsements.** All certificates of insurance and the additional insured endorsements are to be received by the state prior to issuance of the Notice to Proceed. The contractor is responsible to ensure that all policies and coverages contain the necessary endorsements for the State being listed as an additional insured. The state reserves the right to require complete copies of all insurance policies at any time to verify coverage. The contractor shall notify the state within 30 days of any material change in coverage.

11.3. WORKERS' COMPENSATION INSURANCE

- 11.3.1. The Contractor shall carry **Workers' Compensation Insurance**. Such Workers' Compensation Insurance shall protect the Contractor from claims made by his own employees, the employees of any Sub-contractor, and also claims made by anyone directly or indirectly employed by the Contractor or Sub-contractor. The Contractor shall require each Sub-contractor similarly to provide Workers' Compensation Insurance.

11.4. COMMERCIAL GENERAL LIABILITY INSURANCE

- 11.4.1. Each Contractor shall carry per occurrence coverage **Commercial General Liability Insurance** including coverage for premises; operations; independent contractor's protective; products and completed operations; products and materials stored off-site; broad form property damage and comprehensive automobile liability insurance with not less than the following limits of liability:
 - 11.4.1.1. **\$1,000,000 per occurrence; aggregate limit of \$2,000,000;**
- 11.4.2. The **Commercial General and Automobile Liability Insurance** shall provide coverage for both bodily injury, including accidental death, sickness, disease, occupational sickness or disease, personal injury liability coverage and property damage which may arise out of the work under this contract, or operations incidental thereto, whether such work and operations be by the Contractor or by any Subcontractor or by anyone directly or indirectly employed by the Contractor or by Sub-contractor, or by anyone for whose acts any of them may be liable. The Contractor shall maintain the liability insurance required herein for a period of not less than one year after final payment or anytime the Contractor goes on to the location of the project.

- 11.4.3. The Contractor's liability insurance policies shall list the STATE OF MONTANA as an additional insured. **AN ADDITIONAL INSURED ENDORSEMENT DOCUMENT SHALL BE SUBMITTED WITH THE CERTIFICATES OF INSURANCE.** The STATE OF MONTANA includes its officers, elected and appointed officials, employees and volunteers and political subdivisions thereof. Should the Contractor not be able to list the state as an additional insured, the Contractor shall purchase a per occurrence Owner's/Contractor's Protective Policy (OCP) with the STATE OF MONTANA as the insured party in the same occurrence and aggregate limits as that indicated above for the Contractor's Commercial General Liability Policy.
- 11.4.4. Property damage liability insurance shall be written without any exclusion for injury to or destruction of any building, structure, wires, conduits, pipes, or other property above or below the surface of the ground arising out of the blasting, explosion, pile driving, excavation, filling, grading or from the moving, shoring, underpinning, raising, or demolition of any building or structure or structural support thereof.
- 11.4.5. The Contractor's insurance coverage shall be PRIMARY insurance as respects the State, its officers, elected and appointed officials, employees and volunteers. Any insurance or self-insurance maintained by the state, its officers, elected and appointed officials, employees and volunteers shall be excess of the Contractor's insurance and shall not contribute to it. NO WAIVERS OF SUBROGATION OR ENDORSEMENTS LIMITING, TRANSFERRING, OR OTHERWISE INDEMNIFYING LIABLE OR RESPONSIBLE PARTIES OF THE CONTRACTOR OR ANY SUBCONTRACTOR WILL BE ACCEPTED.

11.5. PROPERTY INSURANCE (ALL RISK)

- 11.5.1. New Construction (for projects involving new construction): At its sole cost and expense, the contractor shall keep the building and all other improvements on the premises insured throughout the term of the agreement against the following hazards:
- 11.5.1.1. Loss or damage by fire and such other risks (including earthquake damage for those areas with a shaking level at 10g or above as indicated on the seismic map, <http://rmtd.mt.gov/Portal/62/aboutus/publications/files/NEHRP.pdf> in an amount sufficient to permit such insurance to be written at all times on a replacement cost basis. This may be insured against by attachment of standard form extended coverage endorsement to fire insurance policies. Certificates of Insurance MUST indicate earthquake coverage if coverage is required per the above referenced map.
- 11.5.1.2. Loss or damage from leakage or sprinkler systems now or hereafter installed in any building on the premises.
- 11.5.1.3. Loss or damage by explosion of steam boilers, pressure vessels, and oil or gasoline storage tanks, or similar apparatus now or hereafter installed in a building or buildings on the premises.
- 11.5.2. Building Renovation (for projects involving building renovation or remodeling):
- 11.5.2.1. The contractor shall purchase and maintain Builder's Risk/Installation insurance on a "special causes of loss" form (so called "all risk") for the cost of the work and any subsequent modifications and change orders. The contractor is not responsible for insuring the existing structure for Builder's Risk/Installation insurance.
- 11.5.2.2. At its sole cost and expense, the contractor shall insure all property construction on the premises throughout the term of the agreement against the following hazards:
- 11.5.2.2.1. Loss or damage by fire and such other risks (including earthquake damage for those areas with a shaking level at 10g or above as indicated on the seismic map at <http://rmtd.mt.gov/Portal/62/aboutus/publications/files/NEHRP.pdf> in an amount sufficient to permit such insurance to be written at all times on a replacement cost basis. This may be insured against by attachment of standard form extended coverage endorsement to fire policies. Certificates of Insurance MUST indicate earthquake coverage if coverage is required per the above referenced map.

- 11.5.2.2.2. Loss or damage from leakage or sprinkler systems now or hereafter installed in any building on the premises.
- 11.5.2.2.3. Loss or damage by explosion of steam boilers, pressure vessels, oil or gasoline storage tanks, or similar apparatus now or hereafter installed in a building or buildings on the premises.

11.6. ASBESTOS ABATEMENT INSURANCE

- 11.6.1. If Asbestos Abatement is identified as part of the Work under this contract, the Contractor or any subcontractor involved in asbestos abatement shall purchase and maintain **Asbestos Liability Insurance** for coverage of bodily injury, sickness, disease, death, damages, claims, errors or omissions regarding the asbestos portion of the work ***in addition to*** the CGL Insurance by reason of any negligence in part or in whole, error or omission committed or alleged to have been committed by the Contractor or anyone for whom the Contractor is legally liable.
- 11.6.2. Such insurance shall be in "per occurrence" form and shall clearly state on the certificate that asbestos work is included in the following limits:
 - 11.6.2.1. **\$1,000,000 per occurrence; aggregate limit of \$2,000,000.**
- 11.6.3. Asbestos Liability Insurance as carried by the asbestos abatement subcontractor in these limits in lieu of the Contractor's coverage is acceptable provided the Contractor and the State of Montana are named as additional insureds and that the abatement subcontractor's insurance is PRIMARY as respects both the Owner and the Contractor. If the Contractor or any other subcontractor encounters asbestos, all operations shall be suspended until abatement with the associated air monitoring clearances are accomplished. The certificate of coverage shall be provided by the asbestos abatement subcontractor to both the Contractor and the Owner.

11.7. PERFORMANCE BOND AND LABOR & MATERIAL PAYMENT BOND (BOTH ARE REQUIRED ON THIS PROJECT)

- 11.7.1. For contracts equal to or greater than \$50,000 The Contract shall furnish a Performance Bond in the amount of 100% of the contract price as security for the faithful performance of his contract (18-2-201 MCA). The Contractor shall also furnish a Labor and Material Payment Bond in the amount of 100% of the contract price as security for the payment of all persons performing labor and furnishing materials in connection therewith (18-2-201MCA). The bonds shall be executed on forms furnished by the Owner and no other forms or endorsements will be acceptable. The bonds shall be signed in compliance with state statutes (33-17-1111 MCA). Bonds shall be secured from a state licensed bonding company. Power of Attorney is required with each bond. Attorneys-in-fact who sign contract bonds must file with each bond a certified and effectively dated copy of their power of attorney:
 - 11.7.1.1. one original copy shall be furnished with each set of bonds.
 - 11.7.1.2. Others furnished with a set of bonds may be copies of that original.
- 11.7.2. The Owner reserves the right at any time during the performance of Work to require bonding of Subcontractors provided by the General Contractor. Should this occur, the Owner will cover the direct cost. This shall not be construed as to in any way affect the relationship between the General Contractor and his Subcontractors.
- 11.7.3. Surety must have an endorsement stating that their guarantee of Contractor's performance automatically covers the additional contract time added to a Contractor's contract by Change Order.
- 11.7.4. A change in the Contractor's organization shall not constitute grounds for Surety to claim a discharge of their liability and requires an endorsement from Surety so stating.
- 11.7.5. Except as noted below, the Contractor is required to notify Surety of any increase in the contract amount resulting from a Change Order within 48 hours of signing and submitting a Change Order and shall submit a copy of Surety's written acknowledgment and consent to Owner before a Change Order can be

approved. The Surety's written acknowledgment and consent on the Change Order form shall also satisfy this consent requirement.

11.7.5.1. Surety consent shall not be required on Change Order(s) which, in the aggregate total amount of all Changes Orders, increase the original contract amount by less than 10%. However, the Contractor is still required to notify Surety of any increase in contract amount resulting from a Change Order(s) within 48 hours of signing and submitting every Change Order.

11.7.5.2. Surety is fully obligated to the Owner for the full contract amount, inclusive of all Change Orders, regardless of whether or not written acknowledgement and consent is received and regardless of whether or not the aggregate total of all Change Orders is more or less than 10% of the original contract amount.

11.7.5.3. A fax with hard copy to follow of Surety's written acknowledgment and consent is acceptable. If hard copy is not received by Owner before Application for Payment on any portion or all of said Change Order, it will not be accepted by Owner for payment.

11.7.6. The Surety must take action within 30 days of notice of default on the part of the Contractor or of any claim on bonds made by the Owner or any Subcontractor or supplier.

ARTICLE 12 - UNCOVERING AND CORRECTION OF WORK

12.1. UNCOVERING OF WORK

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

12.1.2. If a portion of the Work has been covered which the Architect/Engineer has not specifically requested to examine prior to it being covered, the Architect/Engineer may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, costs of uncovering and replacement shall, by appropriate Change Order, be at the Owner's expense. If such Work is not in accordance with the Contract Documents, correction shall be at the Contractor's expense unless the condition was caused by the Owner or a separate contractor in which event the Owner shall be responsible for payment of such costs.

12.2. CORRECTION OF WORK

12.2.1. BEFORE OR AFTER SUBSTANTIAL COMPLETION

12.2.1.1. The Contractor shall promptly correct Work that fails to conform to the requirements of the Contract Documents or that is rejected by the Architect/Engineer, whether discovered before or after Substantial Completion and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections and compensation for the Architect/Engineer's services and expenses made necessary thereby, shall be at the Contractor's expense. The Contractor is responsible to discover and correct all defective work and shall not rely upon the Architect/Engineer's or Owner's observations.

12.2.1.2. Rejection and Correction of Work in Progress. During the course of the Work, the Contractor shall inspect and promptly reject any Work that:

12.2.1.2.1. does not conform to the Construction Documents; or,

12.2.1.2.2. does not comply with any applicable law, statute, building code, rule or regulation of any governmental, public and quasi-public authorities, and agencies having jurisdiction over the Project.

12.2.1.3. The Contractor shall promptly correct or require the correction of all rejected Work, whether observed before or after Substantial Completion. The Contractor shall bear all costs of

correcting such Work, including additional testing, inspections, and compensation for all services and expenses necessitated by such corrective action.

12.2.2. AFTER SUBSTANTIAL COMPLETION AND AFTER FINAL ACCEPTANCE

12.2.2.1. In addition to the Contractor's obligations under Paragraph 3.5, if, within one year after the date of Final Acceptance of the Work or designated portion thereof or after the date for commencement of warranties, or by terms of an applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of written notice from the Owner to do so unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner or Architect/Engineer, the Owner may correct it in accordance with Paragraph 2.3.

12.2.2.1.1. The Contractor shall remedy any and all deficiencies due to faulty materials or workmanship and pay for any damage to other work resulting there from, which shall appear within the period of Substantial Completion through one (1) year from the date of Final Acceptance in accordance with the terms and conditions of the Contract and with any special guarantees or warranties provided in the Contract Documents. The Owner shall give notice of observed deficiencies with reasonable promptness. All questions, claims or disputes arising under this Article shall be decided by the Architect/Engineer. All manufacturer, product and supplier warranties are in addition to this Contractor warranty.

12.2.2.1.2. The Contractor shall respond within seven (7) days after notice of observed deficiencies has been given and he shall proceed to immediately remedy these deficiencies.

12.2.2.1.3. Should the Contractor fail to respond to the notice or not remedy those deficiencies; the Owner shall have this work corrected at the expense of the Contractor.

12.2.2.1.4. Latent defects shall be in addition to those identified above and shall be the responsibility of the Contractor per the statute of limitations for a written contract (27-2-208 MCA) starting from the date of Final Acceptance.

12.2.2.2. The one-year period for correction of Work shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual performance of the Work.

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

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

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

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

12.3. ACCEPTANCE OF NONCONFORMING WORK

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

ARTICLE 13 - MISCELLANEOUS PROVISIONS

13.1. GOVERNING LAW

- 13.1.1. The Contract shall be governed by the laws of the State of Montana and venue for all legal proceedings shall be the First Judicial District, Lewis & Clark County.

13.2. SUCCESSORS AND ASSIGNS

- 13.2.1. The Owner and Contractor respectively bind themselves, their partners, successors, assigns and legal representatives to the other party hereto and to partners, successors, assigns and legal representatives of such other party in respect to covenants, agreements and obligations contained in the Contract Documents. Neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempt to make such assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

13.3. WRITTEN NOTICE

- 13.3.1. Written notice shall be deemed to have been duly served if 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 at or sent by registered or certified mail to the last business address known to the party giving notice.

13.4. RIGHTS AND REMEDIES

- 13.4.1. Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights and remedies otherwise imposed or available by law.
- 13.4.2. No action or failure to act by the Owner, Architect/Engineer or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach thereunder, except as may be specifically agreed in writing.

13.5. TESTS AND INSPECTIONS

- 13.5.1. Tests, inspections and approvals of portions of the Work required by the Contract Documents or by laws, ordinances, rules, regulations or orders of public authorities having jurisdiction shall be made at an appropriate time. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections and approvals. The Contractor shall give the Architect/Engineer timely notice of when and where tests and inspections are to be made so that the Architect/Engineer may be present for such procedures. The Owner shall bear costs of tests, inspections or approvals which do not become requirements until after bids are received or negotiations concluded.
- 13.5.2. If the Architect/Engineer, Owner or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection or approval not included under Subparagraph 13.5.1, the Architect/Engineer will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection or approval by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect/Engineer of when and where tests and inspections are to be made so that the Architect/Engineer may be present for such procedures. Such costs, except as provided in Subparagraph 13.5.3 shall be at the Owner's expense.

- 13.5.3. If such procedures for testing, inspection or approval under Subparagraphs 13.5.1 and 13.5.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure including those of repeated procedures and compensation for the Architect/Engineer's services and expenses shall be at the Contractor's expense.
- 13.5.4. Required certificates of testing, inspection or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Architect/Engineer.
- 13.5.5. If the Architect/Engineer is to observe tests, inspections or approvals required by the Contract Documents, the Architect/Engineer will do so promptly and, where practicable, at the normal place of testing.
- 13.5.6. Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

13.6. INTEREST

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

13.7. COMMENCEMENT OF STATUTORY LIMITATION PERIOD

- 13.7.1. As between the Owner and Contractor:

- 13.7.1.1. **Before Substantial Completion.** As to acts or failures to act occurring prior to the relevant date of Substantial Completion, any applicable statute of limitations shall commence to run and any alleged cause of action shall be deemed to have accrued in any and all events not later than such date of Substantial Completion;

- 13.7.1.2. **Between Substantial Completion and Final Certificate for Payment.** As to acts or failures to act occurring subsequent to the relevant date of Substantial Completion and prior to issuance of the final Certificate for Payment, any applicable statute of limitations shall commence to run and any alleged cause of action shall be deemed to have accrued in any and all events not later than the date of issuance of the final Certificate for Payment; and,

- 13.7.1.3. **After Final Payment.** As to acts or failures to act occurring after the relevant date of issuance of the final Certificate for Payment, any applicable statute of limitations shall commence to run and any alleged cause of action shall be deemed to have accrued in any and all events not later than the date of any act or failure to act by the Contractor pursuant to any Warranty provided under Paragraph 3.5, the date of any correction of the Work or failure to correct the Work by the Contractor under Paragraph 12.2, or the date of actual commission of any other act or failure to perform any duty or obligation by the Contractor or Owner, whichever occurs last.

13.8. PAYROLL AND BASIC RECORDS

- 13.8.1. Payrolls and basic records pertaining to the project shall be kept on a generally recognized accounting basis and shall be available to the Owner, Legislative Auditor, the Legislative Fiscal Analyst or his authorized representative at mutually convenient times. Accounting records shall be kept by the Contractor for a period of three years after the date of the Owner's Final Acceptance of the Project.

ARTICLE 14 – TERMINATION OR SUSPENSION OF THE CONTRACT

14.1. TERMINATION BY THE CONTRACTOR

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

- 14.1.1.1. issuance of an order of a court or other public authority having jurisdiction which requires all Work to be stopped; or,
- 14.1.1.2. an act of government, such as a declaration of national emergency which requires all Work to be stopped.
- 14.1.2. The Contractor may terminate the Contract if, through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons or entities performing portions of the Work under direct or indirect contract with the Contractor, repeated suspensions, delays or interruptions of the entire Work by the Owner as described in Paragraph 14.3 constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365-day period, whichever is less.
- 14.1.3. If one of the reasons described in Subparagraph 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days' written notice to the Owner and Architect/Engineer, terminate the Contract and recover from the Owner payment for Work executed and for proven loss with respect to materials, equipment, tools, and construction equipment and machinery, including reasonable overhead and profit but not damages.
- 14.1.4. If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor or a Subcontractor or their agents or employees or any other persons performing portions of the Work under contract with the Contractor because the Owner has persistently failed to fulfill the Owner's obligations under the Contract Documents with respect to matters important to the progress of the Work, the Contractor may, upon seven additional days' written notice to the Owner and the Architect/Engineer, terminate the Contract and recover from the Owner as provided in Subparagraph 14.1.3.

14.2. TERMINATION BY THE OWNER FOR CAUSE

- 14.2.1. The Owner may terminate the Contract if the Contractor:
 - 14.2.1.1. persistently or repeatedly refuses or fails to supply enough properly skilled workers or proper materials;
 - 14.2.1.2. fails to make payment to Subcontractors for materials or labor in accordance with the respective agreements between the Contractor and the Subcontractors;
 - 14.2.1.3. persistently disregards laws, ordinances, or rules, regulations or orders of a public authority having jurisdiction; or,
 - 14.2.1.4. otherwise is guilty of any breach of a provision of the Contract Documents.
- 14.2.2. When any of the above reasons exist, the Owner, upon certification by the Architect/Engineer that sufficient cause exists to justify such action, may without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' written notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:
 - 14.2.2.1. take possession of the site and of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;
 - 14.2.2.2. accept assignment of subcontracts pursuant to Paragraph 5.4; and,
 - 14.2.2.3. finish the Work by whatever reasonable method the Owner may deem expedient. Upon request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.
- 14.2.3. When the Owner terminates the Contract for one of the reasons stated in Subparagraph 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.
- 14.2.4. If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Architect/Engineer's services and expenses made necessary thereby, and other damages incurred

by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall be certified by the Architect/Engineer, upon application, and this obligation for payment shall survive termination of the Contract.

14.3. SUSPENSION BY THE OWNER FOR CONVENIENCE

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

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

14.3.2.1. that performance is, was or would have been so suspended, delayed or interrupted by another cause for which the Contractor is responsible; or,

14.3.2.2. that an equitable adjustment is made or denied under another provision of the Contract.

14.4. TERMINATION BY THE OWNER FOR CONVENIENCE

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

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

14.4.2.1. cease operations as directed by the Owner in the notice;

14.4.2.2. take actions necessary, or that the Owner may direct, for the protection and preservation of the Work, and;

14.4.2.3. except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

14.4.3. In case of such termination for the Owner's convenience, the Contractor shall be entitled to receive payment for Work executed, and costs incurred by reason of such termination, along with reasonable overhead and profit on the Work not executed. The Contractor shall provide a full and complete itemized accounting of all costs.

ARTICLE 15 – EQUAL OPPORTUNITY

15.1. The Contractor and all Sub-contractors shall not discriminate against any employee or applicant for employment because of race, color, sex, pregnancy, childbirth or medical conditions related to pregnancy or childbirth, political or religious affiliation or ideas, culture, creed, social origin or condition, genetic information, sexual orientation, gender identity or expression, national origin, ancestry, age, disability, military service or veteran status, or marital status, or physical or mental disability and shall comply with all Federal and State laws concerning fair labor standards and hiring practices. The Contractor shall ensure that applicants are employed, and that employees are treated during employment, without regard to race, color, sex, pregnancy, childbirth or medical conditions related to pregnancy or childbirth, political or religious affiliation or ideas, culture, creed, social origin or condition, genetic information, sexual orientation, gender identity or expression, national origin, ancestry, age, disability, military service or veteran status, or marital status, or physical or mental disability.

15.2. Such action shall include, but not be limited to the following: employment, upgrading, demotion or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places available to employees and applicants for employment, notices setting forth the policies of non-discrimination.

15.3. The Contractor and all Sub-contractors shall, in all solicitations or advertisements for employees placed by them or on their behalf, state that all qualified applicants will receive consideration for employment without regard

to race, color, sex, pregnancy, childbirth or medical conditions related to pregnancy or childbirth, political or religious affiliation or ideas, culture, creed, social origin or condition, genetic information, sexual orientation, gender identity or expression, national origin, ancestry, age, disability, military service or veteran status, or marital status, or physical or mental disability.

[END OF GENERAL CONDITIONS]

SUPPLEMENTAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION

(REVISED OCTOBER 2019)

FOR STATE OF MONTANA GENERAL CONDITIONS

ARTICLE 1 – GENERAL PROVISIONS

1.1 BASIC DEFINITIONS

1.1.3 SPECIFICATIONS

1.1.3.1 ADD: “Approved”: When used to convey Architect’s/Engineer’s action on Contractor’s submittals, applications, and requests, “approved” is limited to Architect’s/Engineer’s duties and responsibilities as stated in the Conditions of the Contract.

1.1.3.2 ADD: “Directed”: A command or instruction by Architect/Engineer. Other terms including “requested,” “authorized,” “selected,” “required,” and “permitted” have the same meaning as “directed.”

1.1.3.3 ADD: “Indicated”: Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including “shown,” “noted,” “scheduled,” and “specified” have the same meaning as “indicated.”

1.1.3.4 ADD: “Regulations”: Laws ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.

1.1.3.5 ADD: “Furnish”: Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

1.1.3.6 ADD: “Install”: Operations at Project site including unloading, temporarily shoring, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

1.1.3.7 ADD: “Provide”: Furnish and install, complete and ready for the intended use.

1.1.3.8 ADD: “Project site”: Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land or portion of the building on which the Project is to be built.

1.6.1 Insert in the sixth line: “All documents which constitute the instruments of service are the property of the Owner.” In lieu of the phrase “Unless otherwise indicated, the Architect/Engineer and the Architect/Engineer’s consultants shall be deemed the authors of them... except as defined in the Owner’s Contract with the Architect/Engineer.”

ARTICLE 2 – THE OWNER

2.1 THE STATE OF MONTANA

2.1.1.1 ADD: The State of Montana includes its officers, elected and approved officials, employees and volunteers, and political subdivisions thereof. The State of Montana and Montana State University are synonymous throughout the contract documents.

ARTICLE 3 – THE CONTRACTOR

3.3 SUPERVISION AND CONSTRUCTION PROCEDURES

3.3.6 ADD: PRODUCT DELIVERY, STORAGE AND HANDLING

3.3.6.1 ADD: Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer’s written instructions.

3.3.6.2 ADD: DELIVERY AND HANDLING:

3.3.6.2.1 ADD: Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.

3.3.6.2.2 ADD: Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.

3.3.6.2.3 ADD: Deliver products to Project site in an undamaged condition in manufacturer’s original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.

3.3.6.2.4 ADD: Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and property protected.

3.3.6.3 ADD: STORAGE

3.3.6.3.1 ADD: Store products to allow for inspection and measurement of quantity or counting of units

3.3.6.3.2 ADD: Store materials in a manner that will not endanger Project structure.

3.3.6.3.3 ADD: Store products that are subject to damage by the elements under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.

3.3.6.3.4 ADD: Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.

3.3.6.3.5 ADD: Comply with product manufacturer’s written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.

3.3.6.3.6 ADD: Protect stored products from damage and liquids from freezing.

3.10 CONSTRUCTION SCHEDULES

3.10.1.1 ADD: A pre-construction meeting will be held at a time mutually agreed upon by the Owner, Architect/Engineer and Contractor at Campus Planning, Design and Construction, Montana State University, Bozeman, Montana. The contractor shall confirm the Contractor’s Construction Schedule for the Work. Coordination of operating requirements of the affected buildings, and surrounds, schedule of activities and Owner requirements will be discussed, as well as the order in which the Contractor intends to pursue the work. This schedule will be reviewed and must be mutually agreed upon by the Architect, Contractor and Owner.

3.11 DOCUMENTATION AND AS-BUILT CONDITIONS AT THE SITE

3.11.4 ADD: The contractor shall maintain at the site two (2) construction reference sets of all specifications, drawings, approved shop drawings, change orders and other modifications, addenda, schedules and instructions, in good order.

3.11.4.1 ADD: The record drawings shall be two (2) sets of black (or blue) and white prints of the drawings on which the contractor must record all “red line” changes during the course of construction and will include references to change order numbers, field directives, etc., and their dates. This record set shall be maintained separate and apart from documents used for construction reference. This set will be available for review by the project consultant, architect, engineer and MSU project manager at all times.

3.11.4.2 ADD: All as-built conditions shall be kept current and the contractor shall not permanently conceal or cover any work until all required information has been recorded.

3.11.4.3 ADD: All survey and exterior underground utilities shall be recorded using the spatial reference, Montana State Plane, NAD 83, CORS 96, Lambert Conformal Conic. The National Geodetic Survey publishes NAD 83

coordinates in the metric system (i.e., meters). The conversion factor that should be used to convert between English and metric systems is the international conversion factor of 1 ft. = 0.3048 m. coordinate system.

3.11.4.4 ADD: In marking any as-built conditions, the contractor shall ensure that such drawings indicate by measured dimension to building corners or other permanent monuments the exact locations of all piping, conduit or utilities concealed in concrete slabs, behind walls or ceilings or underground. Record drawings shall be made to scale and shall also include exact locations of valves, pull boxes and similar items as required for maintenance or repair service.

3.11.4.5 ADD: The contractor shall prepare and maintain a binder with all project warranty information. This will be provided to the project consultant, architect or engineer at final acceptance.

3.12.1 DEFINITIONS:

3.12.1.4 ADD: Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term “product” includes the terms “material,” “equipment,” “system,” and terms of similar intent.

3.12.1.5 ADD: Named Products: Items identified by manufacturer’s product name, including make or model number or other designation shown or listed in manufacturer’s published product literature that is current as of date of the Contract Documents.

3.12.1.6 ADD: New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.

3.12.1.7 ADD: Comparable Products: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

3.12.1.8 ADD: Basis-of-Design Product Specification: A specification in which a specific manufacturer’s product is named and accompanied by the words “basis-of-design product,” including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specifications.

3.13. USE OF SITE

3.13.3 ADD: MSU BOZEMAN Vehicle Regulations state:

“All students, faculty, staff, and visitors must register any motor vehicle they park on the University campus, for any reason. A visitor is anyone not defined as student, staff or faculty.”

All Contractor and Contractor employees shall comply with Montana State University parking regulations. MSU parking permits can be purchased at the Huffman Building at Seventh Avenue and Kagy Boulevard. Contractor should call University Police at 994-2121 for permit information. Violators of MSU Bozeman Vehicle Regulations may be ticketed and towed.

Unless otherwise indicated on the drawings, all Contractor and Contractor employee vehicles on campus shall be parked in designated parking lots. If allowed on the drawings, vehicles to a maximum number stated, may be parked in project site areas designated and shall only be Contractor vehicles with company signs clearly visible. No personal vehicles shall be parked at the project site in any case. If a driver of a vehicle not allowed to be parked at the project site must unload equipment, tools, or materials, the vehicle must be immediately thereafter moved to a designated lot or leave campus. Vehicles parked in the project site, other than those allowed on the drawings, may be ticketed and towed.

Access to the project site shall be only by the route designated on the drawings. In cases where a different route must be used for a specific purpose, permission must be obtained from MSU Facilities Services. In no case will vehicles be used on the Centennial Mall paving. Access routes are for delivery of equipment, tools, and not for parking.

Site staging areas for materials and equipment if permitted, will be designated on the drawings if permitted. If not designated, staging is intended to be in the construction area boundaries. Staged materials and equipment must be secured on the ground surface or in trailers. Site staging areas shall be fenced.

3.13.4 ADD: The Contractor shall coordinate his operations with the Owner in order that the Owner will have maximum use of existing facilities surrounding the area of the Work, as agreed upon, at all times during normal working hours. Contractor further agrees to coordinate his operations so as to avoid interference with the Owner's normal operations to as great an extent as possible.

3.13.5 ADD: By acceptance of MSU Building Keys the Contractor agrees with the following: University keys are the property of Montana State University. Fabricating, duplicating or modifying University keys is prohibited. Doors must remain locked at all times. The use of these keys to allow unauthorized persons to enter the above areas is prohibited. Loss of any key must be reported immediately to the Director, Office of Facilities Services and University Police, if the loss of keys results in re-keying costs, these costs will be charged to the Contractor. **See attached Estimated Re-Keying Costs.**

3.13.6 ADD: The Montana Legislature decreed that the "right to breath smoke-free air has priority over the desire to smoke" (MCA 20-40-102). It is the policy of MSU to promote the health, wellness and safety of all employees, students, guests, visitors, and contractors while on campus. Therefore, the campus will be free of tobacco-use effective August 1, 2012. The use of tobacco (including cigarettes, cigars, pipes, smokeless tobacco and all other tobacco products) by students, faculty, staff, guests, visitors, and contractors is prohibited on all properties owned or leased by MSU.

Littering any university property, whether owned or leased, with the remains of tobacco products is prohibited.

All university employees, students, visitors, guests, and contractors are required to comply with this policy, which shall remain in effect at all times. Refusal to comply with this policy may be cause for disciplinary action in accordance with employee and student conduct policies. Refusal to comply with the policy by visitors, guests and contractors may be grounds for removal from campus. (http://www2montana.edu/policy/smoking_facilities/)

3.13.7 ADD: The Contractor may use the University's toilet facilities only as directed by the Owner.

ARTICLE 4 – ADMINISTRATION OF THE CONSTRUCTION CONTRACT

4.6. ARBITRATION

4.6.3 Insert in the second line "the Eighteenth Judicial District, Gallatin County" in lieu of "First Judicial District, Lewis & Clark County."

4.6.11 ADD: In responding to a claim brought by a Contractor, the Owner shall have a minimum of forty-five (45) days in which to respond to a revised claim prior to the arbitration hearing.

ARTICLE 7 – CHANGES IN WORK

7.2 CHANGE ORDERS

7.2.2.1 Insert the word "maximum" before "5%" and insert the word "maximum" before "10%".

7.2.2.4 ADD: Total Change Order markup shall not exceed (cost of the work) x 1.15.

7.2.3.1 Insert at the beginning of the first sentence the word "Itemized".

7.2.3.2 Insert at the beginning of the first sentence the word "Itemized".

7.2.3.3 Insert at the beginning of the first sentence the word "Itemized".

7.2.3.4 ADD: The Contractor shall provide a complete description summarizing all work involved.

ARTICLE 8 - TIME

8.1. DEFINITIONS

8.1.8.1 ADD: The Owner will issue a written Notice to Proceed on satisfactory receipt of the signed Contract and all required bonds, insurance and other required submittals. Work commenced before receipt of the Notice to Proceed will be entirely at the Contractor's risk.

8.2. PROGRESS AND COMPLETION

8.2.5 ADD: Completion of the work within the stated time and/or by the date stated on the Notice to Proceed is of the essence of this Contract and failure to complete, without approved time extension, may be considered default of the Contract. At the time for completion as stated on the Notice to Proceed or as extended by approved change order, if the work is not substantially complete, the Owner may notify the Contractor and the Contractor's surety company in writing of the recourse the Owner intends to take, within the Contract, to assess liquidated damages and /or cause the work to be completed.

8.3. DELAYS AND EXTENSIONS OF TIME

8.3.4 ADD: By the act of signing the Contract, the Contractor signifies that he/she and all subcontractors can perform the work within the stated schedule and that subcontractors, manufacturers, suppliers, and deliverers are known to be able to support the schedule. Time extension may be granted for unforeseen conditions or events out of the Contractor's control causing delay in delivery of materials or causing delay in the Contractor's ability to perform the work within the Contract Documents. The Contractor is expected to take all possible measures and bear all reasonable costs in order to anticipate, control, counteract, and expedite such delay-causing conditions, including finding alternative sources of materials, equipment, shipping, and labor. Notification of any claim for schedule delay must be made in writing to the Owner within one week of the causing event or of first knowledge of a known delay causing condition with supporting documentation as required by the Owner. The Owner will respond in writing within one week to claims of delay. No claims of delay will be entertained after the date of completion as stated on the Notice to Proceed or as extended by previously approved delay claims.

ARTICLE 9 – PAYMENTS AND COMPLETION

9.3. APPLICATIONS FOR PAYMENT

9.3.7.2.1. Insert in the first line "Schedule of Values" in lieu of "Schedule of Amounts for Contract Payment".

9.3.7.2.3 ADD: Subcontractor's List: The Contractor shall list all subcontractors doing work in excess of \$5,000.

9.8. SUBSTANTIAL COMPLETION

9.8.4.1 ADD: Prior to the inspection, the Contractor shall complete the final clean-up of the project site which, unless otherwise stated in the Contract Documents, shall consist of:

9.8.4.1.1 Removal of all debris and waste. All construction debris and waste shall be removed from the campus grounds. Use of the University trash containers will not be permitted.

9.8.4.1.2 Removal of all stains, smears, marks of any kind from surfaces including existing surfaces if said damage is the result of the work.

9.8.4.1.3 Removal of all temporary structures and barricades.

9.10. FINAL COMPLETION AND FINAL PAYMENT

9.10.2.4 Insert in the first line after the word "(Form 103)": "for contracts greater than or equal to \$25,000"

ARTICLE 10 – PROTECTIONS OF PERSONS AND PROPERTY

10.1. SAFETY

10.1.2 Insert in the second line before the word "safeguards": "and as approved by Owner,"

10.1.2.1 ADD: The Contractor recognizes that the Work will be conducted in and around buildings and areas that are occupied and will continue to function for the purposes of the University. The Contractor shall conduct a project safety meeting prior to the start of the Work, with the Owner's representative and all others that the Owner's representative deems necessary. The purpose of the meeting shall be to produce project specific rules and guidelines pertaining to but not restricted to: safety of persons in and around the area of the Work including type and location of fencing, guards, signage, etc.; closing of existing campus circulation routes and designation of alternate routes,

including creation of temporary routes of access as required; creation and location of temporary signage as required to maintain accessible routes for handicapped access to and around the site of the Work. The Contractor shall be solely responsible for implementing all required means and methods for site safety and security that may be agreed upon in this meeting.

10.1.2.2 ADD: Contractor shall notify Owner any time his operations will disrupt use of and access to existing accessible routes. Contractor is solely responsible for maintaining existing accessible routes in the area of the project with the exception of temporary interruptions lasting one day or less. Contractor is responsible for erecting signage identifying temporary re-routing of accessible routes. Such re-routing shall be coordinated with Owner in advance.

10.3. UTILITIES

10.3.1 ADD: Underground Utilities: Buried utilities, including, but not limited to, electricity, gas, steam, air, water, telephone, sewer, irrigation, broadband coaxial computer cable, and fiber optic cables are very vulnerable and damage could result in loss of service. The telephone, broadband and fiber optic cables are especially sensitive and the slightest damage to these components will result in disruption of the operations of the campus.

10.3.2 ADD: "One Call" must be notified by phone and in writing at least 72 hours (3 business days) prior to digging to arrange and assist in the location of buried utilities in the field. (Dial 811). The Contractor shall mark the boundary of the work area. The boundary area shall be indicated with white paint and white flags. In winter, pink paint and flags will be accepted.

10.3.3 ADD: After buried utilities have been located, the Contractor shall be responsible for any utilities damaged while digging. Such responsibility shall include all necessary care including hand digging. Contractor's responsibility shall also include maintaining markings after initial locate. The area for such responsibility, unless otherwise indicated, shall extend 24 inches to either side of the marked center line of a buried utility line. In cases of multiple or overlapping utilities or inconclusive electronic locating signals, MSU Project Manager may specifically indicate a wider area for Contractor's responsibility.

10.3.4 ADD: The Contractor's responsibility shall include repair or replacement of damaged utilities. In the event of damage to the 15 KV electrical distribution system, the broadband or fiber optic cables, repair will consist of replacement from termination to termination. Facilities Services and the MSU Information Technology Center will verify repair and recertification. The Contractor will also be responsible for all costs associated with re-terminations and recertification.

10.3.5 ADD: Any buried utilities exposed by the operations of the Contractor shall be marked on the plans and adequately protected by the Contractor. If any buried utilities not located are exposed, the Contractor shall immediately contact Facilities Services at the numbers above. If, after exposing an unlocated buried utility, the Contractor continues digging without notifying Facilities Services and further damages the utility, the Contractor will be responsible.

10.3.6 ADD: Damage to irrigation systems during seasons of no irrigation that are not immediately and adequately repaired and tested will require the Contractor to return when the system is in service to complete the repair.

10.3.7 ADD: In the event of a planned interruption of any existing utility service, the Contractor shall make arrangements with Facilities Services at least 72 hours (3 business days) in advance. Shutdowns of the broadband or fiber optic cables will normally require 5 working days notice to Facilities Services and the Information Technology Center. The Contractor shall bear all costs associated with the interruptions and restorations of service.

10.3.8 ADD: The Owner allows the contractor to use the Owner's utilities (water, heat, electricity) services without charge for procedures necessary for the completion of the work.

ARTICLE 11 - INSURANCE AND BONDS

11.4. COMMERCIAL GENERAL LIABILITY INSURANCE

11.4.1.3. Insert in the first line after "State of Montana": ", Montana State University".

11.7. PERFORMANCE BOND AND LABOR & MATERIAL PAYMENT BOND (BOTH ARE REQUIRED ON THIS PROJECT)

11.7.1. Insert in the first line at the beginning of the sentence "For contracts equal to or greater than \$25,000".

11.8. CANCELLATION

11.8 ADD All Certificates shall contain a provision that coverage provided by the policies will not be cancelled without at least thirty (30) days prior notice to the Owner.

ARTICLE 13 – MISCELLANEOUS PROVISIONS

13.1. GOVERNING LAW

13.1.1. Insert in the second line “The Eighteenth Judicial District, Gallatin County” in lieu of “First Judicial District, Lewis and Clark County”.

13.9 EMERGENCY AND PUBLIC SAFETY

Montana State University has an Emergency and Public Safety Alert System that warns the campus community in the event of an emergency or public safety event. Because contractors, consultants, and vendors are considered members of the campus community when working on campus, they must be familiar with the alert system and understand when the system is used. Montana State University requires all contractors, consultants, vendors, and their employees working on or entering the MSU-Bozeman campus to register for the Emergency and Public Safety Alert System. The link to register is: <http://www.montana.edu/msualert/>.

END OF SUPPLEMENTARY GENERAL CONDITIONS

Cost Estimate to Re-key Buildings

Access to campus buildings is controlled for safety and security reasons. As a key holder the contractor is responsible for following processes associated with maintaining the integrity of our access control program. If a key is lost the contractor is liable for costs associated with ensuring access control is maintained. In some cases that requires re-keying an entire building or key sequence. Cost can range from \$2,000 to over \$200,000 depending on building and key hierarchy.

MONTANA
PREVAILING WAGE RATES FOR BUILDING CONSTRUCTION SERVICES 2023

Effective: January 14, 2023

*Greg Gianforte, Governor
State of Montana*

*Laurie Esau, Commissioner
Department of Labor & Industry*

To obtain copies of prevailing wage rate schedules, or for information relating to public works projects and payment of prevailing wage rates, visit ERD at erd.dli.mt.gov/labor-standards or contact:

Employment Standards Division
Montana Department of Labor and Industry
P. O. Box 8011
Helena, MT 59601
Phone 406-444-6543

The department welcomes questions, comments, and suggestions from the public. In addition, we'll do our best to provide information in an accessible format, upon request, in compliance with the Americans with Disabilities Act.

MONTANA PREVAILING WAGE REQUIREMENTS

The Commissioner of the Department of Labor and Industry, in accordance with Sections 18-2-401 and 18-2-402 of the Montana Code Annotated (MCA), has determined the standard prevailing rate of wages for the occupations listed in this publication.

The wages specified herein control the prevailing rate of wages for the purposes of Section 18-2-401, et seq., MCA. It is required each employer pay (as a minimum) the rate of wages, including fringe benefits, travel allowance, zone pay and per diem applicable to the district in which the work is being performed as provided in the attached wage determinations.

All Montana Prevailing Wage Rates are available on the internet at erd.dli.mt.gov/labor-standards or by contacting the department at (406) 444-6543.

In addition, this publication provides general information concerning compliance with Montana's Prevailing Wage Law and the payment of prevailing wages. For detailed compliance information relating to public works contracts and payment of prevailing wage rates, please consult the regulations on the internet at erd.dli.mt.gov/labor-standards or contact the department at (406) 444-6543.

LAURIE ESAU
Commissioner
Department of Labor and Industry
State of Montana

TABLE OF CONTENTS

MONTANA PREVAILING WAGE REQUIREMENTS:

A. Date of Publication	3
B. Definition of Building Construction	3
C. Definition of Public Works Contract	3
D. Prevailing Wage Schedule	3
E. Rates to Use for Projects	3
F. Wage Rate Adjustments for Multiyear Contracts	3
G. Fringe Benefits	4
H. Prevailing Wage Districts	4
I. Dispatch City	5
J. Zone Pay	5
K. Computing Travel Benefits	5
L. Per Diem	5
M. Apprentices	5
N. Posting Notice of Prevailing Wages	5
O. Employment Preference	5
P. Projects of a Mixed Nature	6
Q. Occupations Definitions Website	6
R. Welder Rates	6
S. Foreman Rates	6

WAGE RATES:

BOILERMAKERS	7
BRICK, BLOCK, AND STONE MASONS	7
CARPENTERS	7
CARPET INTALLERS	7
CEMENT MASONS AND CONCRETE FINISHERS	8
CONSTRUCTION EQUIPMENT OPERATORS	
OPERATORS GROUP 1	8
OPERATORS GROUP 2	9
OPERATORS GROUP 3	9
OPERATORS GROUP 4	10
OPERATORS GROUP 5	10
OPERATORS GROUP 6	10
OPERATORS GROUP 7	11
CONSTRUCTION LABORERS	
LABORERS GROUP 1	11
LABORERS GROUP 2	11
LABORERS GROUP 3	12
LABORERS GROUP 4	12
DRYWALL APPLICATORS	12
ELECTRICIANS: INCLUDING BUILDING AUTOMATION CONTROL	13
ELEVATOR CONSTRUCTORS	13
FLOOR LAYERS	14
GLAZIERS	14
HEATING AND AIR CONDITIONING	14
INSULATION WORKERS - MECHANICAL (HEAT AND FROST)	14
IRONWORKERS - REINFORCING IRON AND REBAR WORKERS	15
IRONWORKERS - STRUCTURAL IRON AND REBAR WORKERS	15
MILLWRIGHTS	15
PAINTERS: INCLUDING PAPERHANGERS	16
PILE BUCKS	16
PILOT CAR DRIVERS	16
PLASTERERS	16
PLUMBERS, PIPEFITTERS, AND STEAMFITTERS	17
ROOFERS	18
SHEET METAL WORKERS	18
SOLAR PHOTOVOLTAIC INSTALLERS	19
SPRINKLER FITTERS	19
TAPERS	20
TELECOMMUNICATIONS EQUIPMENT INSTALLERS	21
TERRAZZO WORKERS AND FINISHERS	21
TILE AND STONE SETTERS	21
TRUCK DRIVERS	22

A. Date of Publication January 14, 2023

B. Definition of Building Construction

For the purposes of Prevailing Wage, the Commissioner of Labor and Industry has determined that building construction occupations are defined to be those performed by a person engaged in a recognized trade or craft, or any skilled, semi-skilled, or unskilled manual labor related to the construction, alteration, or repair of a public building or facility, and does not include engineering, superintendence, management, office or clerical work.

The Administrative Rules of Montana (ARM), 24.17.501(2) – 2(a), states *“Building construction projects generally are the constructions of sheltered enclosures with walk-in access for housing persons, machinery, equipment, or supplies. It includes all construction of such structures, incidental installation of utilities and equipment, both above and below grade level, as well as incidental grading, utilities and paving.”*

Examples of building construction include, but are not limited to, alterations and additions to buildings, apartment buildings (5 stories and above), arenas (closed), auditoriums, automobile parking garages, banks and financial buildings, barracks, churches, city halls, civic centers, commercial buildings, court houses, detention facilities, dormitories, farm buildings, fire stations, hospitals, hotels, industrial buildings, institutional buildings, libraries, mausoleums, motels, museums, nursing and convalescent facilities, office buildings, out-patient clinics, passenger and freight terminal buildings, police stations, post offices, power plants, prefabricated buildings, remodeling buildings, renovating buildings, repairing buildings, restaurants, schools, service stations, shopping centers, stores, subway stations, theaters, warehouses, water and sewage treatment plants (buildings only), etc.”

C. Definition of Public Works Contract

Section 18-2-401(11)(a), MCA defines “public works contract” as *“...a contract for construction services let by the state, county, municipality, school district, or political subdivision or for nonconstruction services let by the state, county, municipality, or political subdivision in which the total cost of the contract is in excess of \$25,000...”*.

D. Prevailing Wage Schedule

This publication covers only Building Construction occupations and rates. These rates will remain in effect until superseded by a more current publication. Current prevailing wage rate schedules for Heavy Construction, Highway Construction, and Nonconstruction Services occupations can be found on the internet at www.mtwagehoubopa.com or by contacting the department at (406) 444-6543.

E. Rates to Use for Projects

ARM, 24.17.127(1)(c), states *“The wage rates applicable to a particular public works project are those in effect at the time the bid specifications are advertised.”*

F. Wage Rate Adjustments for Multiyear Contracts

Section 18-2-417, MCA states:

“(1) Any public works contract that by the terms of the original contract calls for more than 30 months to fully perform must include a provision to adjust, as provided in subsection (2), the standard prevailing rate of wages to be paid to the workers performing the contract.

(2) The standard prevailing rate of wages paid to workers under a contract subject to this section must be adjusted 12 months after the date of the award of the public works contract. The amount of the adjustment must be a 3% increase. The adjustment must be made and applied every 12 months for the term of the contract.

(3) Any increase in the standard rate of prevailing wages for workers under this section is the sole responsibility of the contractor and any subcontractors and not the contracting agency.”

G. Fringe Benefits

Section 18-2-412, MCA states:

“(1) To fulfill the obligation...a contractor or subcontractor may:

(a) pay the amount of fringe benefits and the basic hourly rate of pay that is part of the standard prevailing rate of wages directly to the worker or employee in cash;

(b) make an irrevocable contribution to a trustee or a third person pursuant to a fringe benefit fund, plan, or program that meets the requirements of the Employee Retirement Income Security Act of 1974 or that is a bona fide program approved by the U. S. department of labor; or

(c) make payments using any combination of methods set forth in subsections (1)(a) and (1)(b) so that the aggregate of payments and contributions is not less than the standard prevailing rate of wages, including fringe benefits and travel allowances, applicable to the district for the particular type of work being performed.

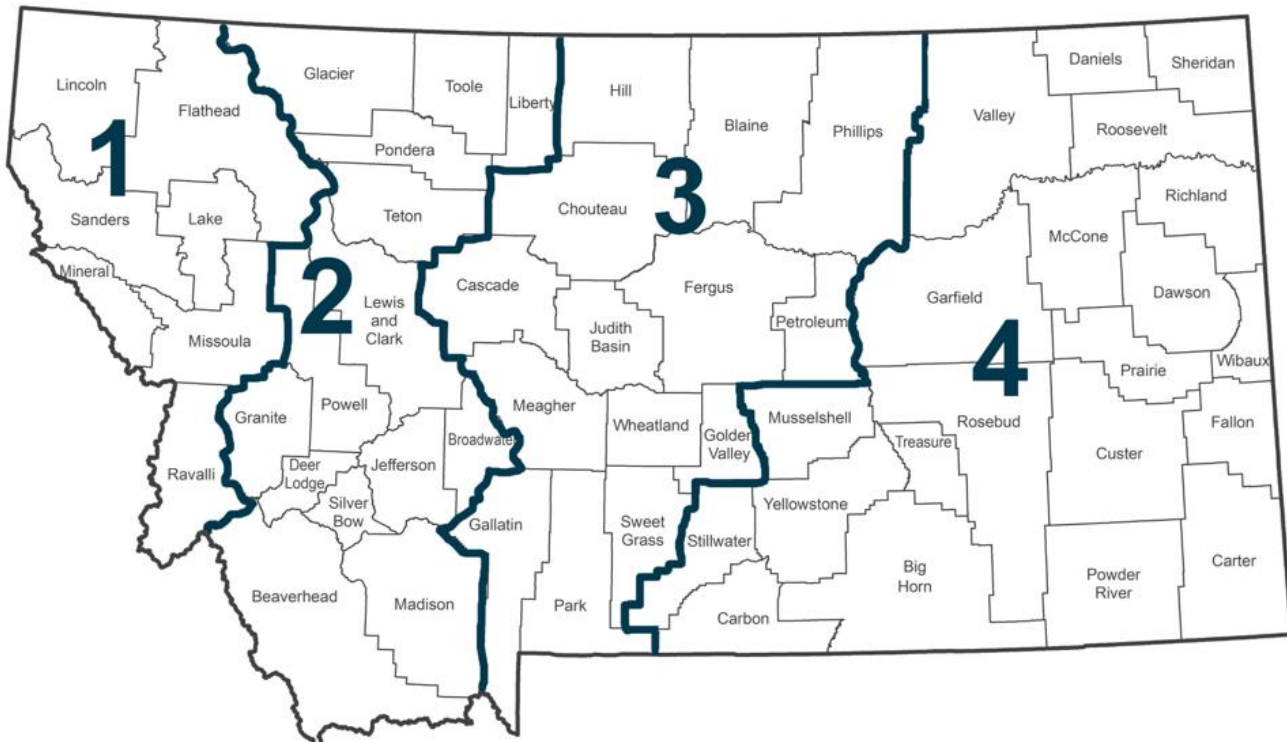
(2) The fringe benefit fund, plan, or program described in subsection (1)(b) must provide benefits to workers or employees for health care, pensions on retirement or death, life insurance, disability and sickness insurance, or bona fide programs that meet the requirements of the Employee Retirement Income Security Act of 1974 or that are approved by the U. S. department of labor.”

Fringe benefits are paid for all hours worked (straight time and overtime hours). However, fringe benefits are not to be considered a part of the hourly rate of pay for calculating overtime, unless there is a collectively bargained agreement in effect that specifies otherwise.

H. Prevailing Wage Districts

Montana counties are aggregated into 4 districts for the purpose of prevailing wage. The prevailing wage districts are composed of the following counties:

Montana Prevailing Wage Districts



I. Dispatch City

ARM, 24.17.103(11), defines dispatch city as “...the courthouse in the city from the following list which is closest to the center of the job: Billings, Bozeman, Butte, Great Falls, Helena, Kalispell, Miles City, Missoula and Sidney.” A dispatch city shall be considered the point of origin only for jobs within the counties identified in that district (as shown below):

District 1 – Kalispell and Missoula: includes Flathead, Lake, Lincoln, Mineral, Missoula, Ravalli, and Sanders;

District 2 – Butte and Helena: includes Beaverhead, Broadwater, Deer Lodge, Glacier, Granite, Jefferson, Lewis and Clark, Liberty, Madison, Pondera, Powell, Silver Bow, Teton, and Toole;

District 3 – Bozeman and Great Falls: includes Blaine, Cascade, Chouteau, Fergus, Gallatin, Golden Valley, Hill, Judith Basin, Meagher, Park, Petroleum, Phillips, Sweet Grass, and Wheatland;

District 4 – Billings, Miles City and Sidney: includes Big Horn, Carbon, Carter, Custer, Daniels, Dawson, Fallon, Garfield, McCone, Musselshell, Powder River, Prairie, Richland, Roosevelt, Rosebud, Sheridan, Stillwater, Treasure, Valley, Wibaux, and Yellowstone.

J. Zone Pay

Zone pay is not travel pay. ARM, 24.17.103(25), defines zone pay as “...an amount added to the base pay; the combined sum then becomes the new base wage rate to be paid for all hours worked on the project. Zone pay must be determined by measuring the road miles one way over the shortest practical maintained route from the dispatch city to the center of the job.” See section I above for a list of dispatch cities.

K. Computing Travel Benefits

ARM, 24.17.103(23), states “ ‘Travel pay,’ also referred to as ‘travel allowance,’ is and must be paid for travel both to and from the job site, except those with special provisions listed under the classification. The rate is determined by measuring the road miles one direction over the shortest practical maintained route from the dispatch city or the employee’s home, whichever is closer, to the center of the job.” See section I above for a list of dispatch cities.

L. Per Diem

ARM, 24.17.103(19), states “ ‘Per diem’ typically covers costs associated with board and lodging expenses. Per diem is paid when an employee is required to work at a location outside the daily commuting distance and is required to stay at that location overnight or longer.”

M. Apprentices

Wage rates for apprentices registered in approved federal or state apprenticeship programs are contained in those programs. Additionally, Section 18-2-416(2), MCA states “...The full amount of any applicable fringe benefits must be paid to the apprentice while the apprentice is working on the public works contract.” Apprentices not registered in approved federal or state apprenticeship programs will be paid the appropriate journey level prevailing wage rate when working on a public works contract.

N. Posting Notice of Prevailing Wages

Section 18-2-406, MCA provides that contractors, subcontractors and employers who are “...performing work or providing construction services under public works contracts, as provided in this part, shall post in a prominent and accessible site on the project or staging area, not later than the first day of work and continuing for the entire duration of the project, a legible statement of all wages and fringe benefits to be paid to the employees.”

O. Employment Preference

Sections 18-2-403 and 18-2-409, MCA requires contractors to give preference to the employment of bona fide Montana residents in the performance of work on public works contracts.

P. Projects of a Mixed Nature

Section 18-2-408, MCA states:

“(1) The contracting agency shall determine, based on the preponderance of labor hours to be worked, whether the public works construction services project is classified as a highway construction project, a heavy construction project, or a building construction project.

“(2) Once the project has been classified, employees in each trade classification who are working on that project must be paid at the rate for that project classification”

Q. Occupations Definitions

You can find definitions for these occupations on the following Bureau of Labor Statistics website:

http://www.bls.gov/oes/current/oes_stru.htm

R. Welder Rates

Welders receive the rate prescribed for the craft performing an operation to which welding is incidental.

S. Foreman Rates

Rates are no longer set for foremen. However, if a foreman performs journey level work, the foreman must be paid at least the journey level rate.

WAGE RATES

BOILERMAKERS

No Rate Established

Duties Include:

Construct, assemble, maintain, and repair stationary steam boilers, boiler house auxiliaries, process vessels, and pressure vessels.

[↑ Back to Table of Contents](#)

Travel and Per Diem:

All Districts

No travel or per diem established.

BRICK, BLOCK, AND STONE MASONS

	Wage	Benefit
District 1	\$32.32	\$16.78
District 2	\$32.32	\$16.78
District 3	\$32.32	\$16.78
District 4	\$32.32	\$16.78

[↑ Back to Table of Contents](#)

Travel:

All Districts

0-70 mi. free zone

>70-90 mi. \$60.00/day

>90 mi. \$80.00/day

CARPENTERS

	Wage	Benefit
District 1	\$26.12	\$12.00
District 2	\$26.50	\$14.07
District 3	\$26.50	\$14.07
District 4	\$26.50	\$14.07

Duties Include:

Install roll and batt insulation, and hardwood floors.

[↑ Back to Table of Contents](#)

Zone Pay:

All Districts

0-30 mi. free zone

>30-60 mi. base pay + \$4.00/hr.

>60 mi. base pay + \$6.00/hr.

CARPET INSTALLERS

No Rate Established

Duties Include:

Lay and install carpet from rolls or blocks on floors. Install padding and trim flooring materials.

[↑ Back to Table of Contents](#)

Travel and Per Diem:

All Districts

No travel or per diem established.

CEMENT MASONS AND CONCRETE FINISHERS

	Wage	Benefit
District 1	\$24.00	\$8.85
District 2	\$22.63	\$7.36
District 3	\$21.17	\$3.67
District 4	\$20.57	\$3.67

Duties Include:

Smooth and finish surfaces of poured concrete, such as floors, walks, sidewalks, or curbs. Align forms for sidewalks, curbs, or gutters.

[↑ Back to Table of Contents](#)

Travel and Per Diem:

All Districts

No travel or per diem established.

CONSTRUCTION EQUIPMENT OPERATORS GROUP 1

	Wage	Benefit
District 1	\$25.47	\$12.92
District 2	\$28.21	\$12.92
District 3	\$28.21	\$12.92
District 4	\$28.21	\$12.92

This group includes but is not limited to:

Air Compressor; Auto Fine Grader; Belt Finishing; Boring Machine (Small); Cement Silo; Crane, A-Frame Truck Crane; Crusher Conveyor; DW-10, 15, and 20 Tractor Roller; Farm Tractor; Forklift; Form Grader; Front-End Loader, under 1 cu. yd; Oiler, Herman Nelson Heater; Mucking Machine; Oiler, All Except Cranes/Shovels; Pumpman.

[↑ Back to Table of Contents](#)

Zone Pay:

All Districts

0-30 mi. free zone

>30-60 mi. base pay + \$3.50/hr.

>60 mi. base pay + \$5.50/hr.

CONSTRUCTION EQUIPMENT OPERATORS GROUP 2

	Wage	Benefit
District 1	\$26.95	\$ 9.50
District 2	\$33.32	\$ 9.44
District 3	\$27.99	\$12.92
District 4	\$29.33	\$12.92

This group includes but is not limited to:

Air Doctor; Backhoe\Excavator\Shovel, up to and incl. 3 cu. yds; Bit Grinder; Bituminous Paving Travel Plant; Boring Machine, Large; Broom, Self-Propelled; Concrete Travel Batcher; Concrete Float & Spreader; Concrete Bucket Dispatcher; Concrete Finish Machine; Concrete Conveyor; Distributor; Dozer, Rubber-Tired, Push, & Side Boom; Elevating Grader\Gradall; Field Equipment Serviceman; Front-End Loader, 1 cu. yd up to and incl. 5 cu. yds; Grade Setter; Heavy Duty Drills, All Types; Hoist\Tugger, All; Hydralift Forklifts & Similar; Industrial Locomotive; Motor Patrol (except finish); Mountain Skidder; Oiler, Cranes\Shovels; Pavement Breaker, EMSCO; Power Saw, Self-Propelled; Pugmill; Pumpcrete\Grout Machine; Punch Truck; Roller, other than Asphalt; Roller, Sheepsfoot (Self-Propelled); Roller, 25 tons and over; Ross Carrier; Rotomill, under 6 ft; Trenching Machine; Washing /Screening Plant.

[↑ Back to Table of Contents](#)

Zone Pay:

All Districts

0-30 mi. free zone

>30-60 mi. base pay + \$3.50/hr.

>60 mi. base pay + \$5.50/hr.

CONSTRUCTION EQUIPMENT OPERATORS GROUP 3

	Wage	Benefit
District 1	\$25.81	\$12.92
District 2	\$29.75	\$12.92
District 3	\$29.75	\$12.92
District 4	\$29.75	\$12.92

This group includes but is not limited to:

Asphalt Paving Machine; Asphalt Screed; Backhoe\Excavator\Shovel, over 3 cu. yds; Cableway Highline; Concrete Batch Plant; Concrete Curing Machine; Concrete Pump; Cranes, Creter; Cranes, Electric Overhead; Cranes, 24 tons and under; Curb Machine\Slip Form Paver; Finish Dozer; Front-End Loader, over 5 cu. yds; Mechanic\Welder; Pioneer Dozer; Roller Asphalt (Breakdown & Finish); Rotomill, over 6 ft; Scraper, Single, Twin, or Pulling Belly-Dump; YO-YO Cat.

[↑ Back to Table of Contents](#)

Zone Pay:

All Districts

0-30 mi. free zone

>30-60 mi. base pay + \$3.50/hr.

>60 mi. base pay + \$5.50/hr.

CONSTRUCTION EQUIPMENT OPERATORS GROUP 4

	Wage	Benefit
District 1	\$26.70	\$12.92
District 2	\$29.62	\$14.21
District 3	\$30.75	\$12.92
District 4	\$30.75	\$12.92

This group includes but is not limited to:

Asphalt\Hot Plant Operator; Cranes, 25 tons up to and incl. 44 tons; Crusher Operator; Finish Motor Patrol; Finish Scraper.

[↑ Back to Table of Contents](#)

Zone Pay:

All Districts

0-30 mi. free zone

>30-60 mi. base pay + \$3.50/hr.

>60 mi. base pay + \$5.50/hr.

CONSTRUCTION EQUIPMENT OPERATORS GROUP 5

	Wage	Benefit
District 1	\$31.75	\$12.92
District 2	\$31.75	\$12.92
District 3	\$30.33	\$15.08
District 4	\$31.75	\$12.92

This group includes but is not limited to:

Cranes, 45 tons up to and incl. 74 tons.

[↑ Back to Table of Contents](#)

Zone Pay:

All Districts

0-30 mi. free zone

>30-60 mi. base pay + \$3.50/hr.

>60 mi. base pay + \$5.50/hr.

CONSTRUCTION EQUIPMENT OPERATORS GROUP 6

	Wage	Benefit
District 1	\$32.75	\$12.92
District 2	\$32.75	\$12.92
District 3	\$32.75	\$12.92
District 4	\$32.75	\$12.92

This group includes but is not limited to:

Cranes, 75 tons up to and incl. 149 tons; Cranes, Whirley (All).

[↑ Back to Table of Contents](#)

Zone Pay:

All Districts

0-30 mi. free zone

>30-60 mi. base pay + \$3.50/hr.

>60 mi. base pay + \$5.50/hr.

CONSTRUCTION EQUIPMENT OPERATORS GROUP 7

	Wage	Benefit
District 1	\$33.75	\$12.92
District 2	\$33.75	\$12.92
District 3	\$33.75	\$12.92
District 4	\$33.75	\$12.92

This group includes but is not limited to:

Cranes, 150 tons up to and incl. 250 tons; Cranes, over 250 tons—add \$1.00 for every 100 tons over 250 tons; Crane, Tower (All); Crane Stiff-Leg or Derrick; Helicopter Hoist.

Zone Pay:

All Districts

0-30 mi. free zone

>30-60 mi. base pay + \$3.50/hr.

>60 mi. base pay + \$5.50/hr.

[↑ Back to Table of Contents](#)

CONSTRUCTION LABORERS GROUP 1/FLAG PERSON FOR TRAFFIC CONTROL

	Wage	Benefit
District 1	\$23.55	\$11.82
District 2	\$23.55	\$11.82
District 3	\$23.55	\$11.82
District 4	\$23.55	\$11.82

Zone Pay:

All Districts

0-15 mi. free zone

>15-30 mi. base pay + \$0.65/hr.

>30-50 mi. base pay + \$0.85/hr.

>50 mi. base pay + \$1.25/hr.

[↑ Back to Table of Contents](#)

CONSTRUCTION LABORERS GROUP 2

	Wage	Benefit
District 1	\$21.63	\$ 7.43
District 2	\$20.07	\$ 9.82
District 3	\$22.91	\$11.82
District 4	\$20.71	\$ 7.93

Zone Pay:

All Districts

0-15 mi. free zone

>15-30 mi. base pay + \$0.65/hr.

>30-50 mi. base pay + \$0.85/hr.

>50 mi. base pay + \$1.25/hr.

This group includes but is not limited to:

General Labor; Asbestos Removal; Burning Bar; Bucket Man; Carpenter Tender; Caisson Worker; Cement Mason Tender; Cement Handler (dry); Chuck Tender; Choker Setter; Concrete Worker; Curb Machine-lay Down; Crusher and Batch Worker; Heater Tender; Fence Erector; Landscape Laborer; Landscaper; Lawn Sprinkler Installer; Pipe Wrapper; Pot Tender; Powderman Tender; Rail and Truck Loaders and Unloaders; Riprapper; Sign Erection; Guardrail and Jersey Rail; Spike Driver; Stake Jumper; Signalman; Tail Hoseman; Tool Checker and Houseman and Traffic Control Worker.

[↑ Back to Table of Contents](#)

CONSTRUCTION LABORERS GROUP 3

	Wage	Benefit
District 1	\$24.55	\$11.82
District 2	\$24.55	\$11.82
District 3	\$24.55	\$11.82
District 4	\$24.55	\$11.82

This group includes but is not limited to:

Concrete Vibrator; Dumpman (Grademan); Equipment Handler; Geotextile and Liners; High-Pressure Nozzleman; Jackhammer (Pavement Breaker) Non-Riding Rollers; Pipelayer; Posthole Digger (Power); Power Driven Wheelbarrow; Rigger; Sandblaster; Sod Cutter-Power and Tamper.

[↑ Back to Table of Contents](#)

Zone Pay:

All Districts

0-15 mi. free zone
>15-30 mi. base pay + \$0.65/hr.
>30-50 mi. base pay + \$0.85/hr.
>50 mi. base pay + \$1.25/hr.

CONSTRUCTION LABORERS GROUP 4

	Wage	Benefit
District 1	\$23.09	\$11.82
District 2	\$24.60	\$11.82
District 3	\$22.44	\$12.22
District 4	\$21.38	\$12.22

This group includes but is not limited to:

Hod Carrier***; Water Well Laborer; Blaster; Wagon Driller; Asphalt Raker; Cutting Torch; Grade Setter; High-Scaler; Power Saws (Faller & Concrete) Powderman; Rock & Core Drill; Track or Truck Mounted Wagon Drill and Welder incl. Air Arc.

[↑ Back to Table of Contents](#)

Zone Pay:

All Districts

0-15 mi. free zone
>15-30 mi. base pay + \$0.65/hr.
>30-50 mi. base pay + \$0.85/hr.
>50 mi. base pay + \$1.25/hr.

***Hod Carriers will receive the same amount of travel and/or subsistence pay as bricklayers when requested to travel.

DRYWALL APPLICATORS

	Wage	Benefit
District 1	\$26.50	\$14.07
District 2	\$26.50	\$14.07
District 3	\$26.50	\$14.07
District 4	\$26.50	\$14.07

Duties Include:

Drywall and ceiling tile installation.

[↑ Back to Table of Contents](#)

Zone Pay:

All Districts

0-30 mi. free zone
>30-60 mi. base pay + \$4.00/hr.
>60 mi. base pay + \$6.00/hr.

ELECTRICIANS: INCLUDING BUILDING AUTOMATION CONTROL

	Wage	Benefit
District 1	\$33.22	\$15.91
District 2	\$32.18	\$16.93
District 3	\$32.56	\$14.56
District 4	\$36.69	\$15.98

Duties Include:

Electrical wiring; equipment and fixtures; street lights; electrical control systems. Installation and/or adjusting of building automation controls also during testing and balancing, commissioning and retro-commissioning.

Travel:

District 1

No mileage due when traveling in employer's vehicle.

The following travel allowance is applicable when traveling in employee's vehicle:

- 0-15 mi. free zone
- >15-45 mi. \$0.625/mi. in excess of the free zone
- >45 mi. \$75.00/day

Districts 2 and 3

No mileage due when traveling in employer's vehicle.

The following travel allowance is applicable when traveling in employee's vehicle:

- 0-08 mi. free zone
- >08-50 mi. federal mileage rate/mi. in excess of the free zone.
- >50 mi. \$71.57/day

District 4

No mileage due when traveling in employer's vehicle.

The following travel allowance is applicable when traveling in employee's vehicle:

- 0-18 mi. free zone
- >18-60 mi. federal mileage rate/mi.
- >60 mi. \$75.00/day

[↑ Back to Table of Contents](#)

ELEVATOR CONSTRUCTORS

	Wage	Benefit
District 1	\$59.70	\$44.11
District 2	\$59.70	\$44.11
District 3	\$59.70	\$44.11
District 4	\$59.70	\$44.11

Travel:

All Districts

- 0-15 mi. free zone
- >15-25 mi. \$47.85/day
- >25-35 mi. \$95.70/day
- >35 mi. \$104.54/day or cost of receipts for hotel and meals, whichever is greater.

Special Provision:

When in employees vehicle additional reimbursement of 1.5% of the prevailing wage rate is added to the amounts above.

[↑ Back to Table of Contents](#)

FLOOR LAYERS

No Rate Established

Apply blocks, strips, or sheets of shock-absorbing, sound-deadening, or decorative coverings to floors.

[↑ Back to Table of Contents](#)

Travel and Per Diem:

All Districts

No travel or per diem established.

GLAZIERS

	Wage	Benefit
District 1	\$21.44	\$4.01
District 2	\$21.88	\$4.29
District 3	\$22.31	\$3.99
District 4	\$22.04	\$3.87

[↑ Back to Table of Contents](#)

Travel and Per Diem:

All Districts

No travel or per diem established.

HEATING AND AIR CONDITIONING

	Wage	Benefit
District 1	\$33.00	\$20.73
District 2	\$33.00	\$20.73
District 3	\$33.00	\$20.73
District 4	\$33.00	\$20.73

Duties Include:

Testing and balancing, commissioning and retro-commissioning of all air-handling equipment and duct work.

[↑ Back to Table of Contents](#)

Travel:

All Districts

0-50 mi. free zone

>50 mi.

- \$0.25/mi. in employer vehicle.
- \$0.65/mi. in employee vehicle.

Per Diem:

All Districts

\$85/day

INSULATION WORKERS - MECHANICAL (HEAT AND FROST)

	Wage	Benefit
District 1	\$39.37	\$19.87
District 2	\$39.37	\$19.87
District 3	\$39.37	\$19.87
District 4	\$39.37	\$19.87

Duties Include:

Insulate pipes, ductwork or other mechanical systems.

[↑ Back to Table of Contents](#)

Travel:

All Districts

0-30 mi. free zone

>30-40 mi. \$25.00/day

>40-50 mi. \$35.00/day

>50-60 mi. \$50.00/day

>60 mi. \$60.00/day plus

- \$0.56/mi. if transportation is not provided.
 - \$0.20/mi. if in company vehicle.
- >60 mi. \$105.00/day on jobs requiring an overnight stay plus
- \$0.56/mi. if transportation is not provided.
 - \$0.20/mi. if in company vehicle.

IRONWORKERS – REINFORCING IRON AND REBAR WORKERS

	Wage	Benefit
District 1	\$30.53	\$27.91
District 2	\$29.54	\$24.49
District 3	\$29.54	\$24.49
District 4	\$29.54	\$24.99

Duties Include:

Cut, bend, tie, and place rebar.

Travel:

District 1

0-45 mi. free zone
>45-60 mi. \$50.00/day
>60-100 mi. \$75.00/day
>100 mi. \$95.00/day

Special Provision:

When the employer provides transportation, travel will not be paid. However, when an employee is required to travel over 70 miles one way, the employee may elect to receive the travel pay in lieu of the transportation.

Districts 2, 3 & 4

0-45 mi. free zone
>45-85 mi. \$70.00/day
>85 mi. \$100.00/day

[↑ Back to Table of Contents](#)

IRONWORKERS – STRUCTURAL IRON AND STEEL WORKERS

	Wage	Benefit
District 1	\$30.53	\$27.91
District 2	\$29.54	\$24.49
District 3	\$29.54	\$24.49
District 4	\$29.54	\$24.49

Duties Include:

Structural steel erection; assemble prefabricated metal buildings; energy producing windmill type towers; metal bleacher seating; handrail fabrication and ornamental steel.

Travel:

District 1

0-45 mi. free zone
>45-60 mi. \$50.00/day
>60-100 mi. \$75.00/day
>100 mi. \$95.00/day

Special Provision:

When the employer provides transportation, travel will not be paid. However, when an employee is required to travel over 70 miles one way, the employee may elect to receive the travel pay in lieu of the transportation.

Districts 2, 3 & 4

0-45 mi. free zone
>45-85 mi. \$70.00/day
>85 mi. \$100.00/day

[↑ Back to Table of Contents](#)

MILLWRIGHTS

	Wage	Benefit
District 1	\$42.43	\$14.52
District 2	\$42.43	\$14.52
District 3	\$42.43	\$14.52
District 4	\$42.43	\$14.52

Zone Pay:

All Districts

0-30 mi. free zone
>30-60 mi. base pay + \$4.00/hr.
>60 mi. base pay + \$6.00/hr.

[↑ Back to Table of Contents](#)

PAINTERS: INCLUDING PAPERHANGERS

	Wage	Benefit
District 1	\$24.20	\$7.61
District 2	\$23.10	\$7.61
District 3	\$22.59	\$8.31
District 4	\$22.56	\$7.37

[↑ Back to Table of Contents](#)

Travel and Per Diem:

All Districts

No travel or per diem established.

PILE BUCKS

	Wage	Benefit
District 1	\$33.50	\$14.07
District 2	\$33.50	\$14.07
District 3	\$33.50	\$14.07
District 4	\$33.50	\$14.07

Duties Include:

Set up crane; set up hammer; weld tips on piles; set leads; insure piles are driven straight with the use of level or plum bob. Give direction to crane operator as to speed and direction of swing. Cut piles to grade.

[↑ Back to Table of Contents](#)

Zone Pay:

All Districts

0-30 mi. free zone

>30-60 mi. base pay + \$4.00/hr.

>60 mi. base pay + \$6.00/hr.

PILOT CAR DRIVERS

No Rate Established

[↑ Back to Table of Contents](#)

Zone Pay:

All Districts

No zone pay established.

PLASTERERS

No Rate Established

Duties Include:

All materials beyond the substrate, such as a moisture barrier, any type of drainage installation between the moisture barrier and insulation or EPS board, the attachment of the EPS board, installation of fiberglass mesh embedded in the base coat, any water-resistant coat that is applied on top of the insulation to serve as a weather barrier, and the application of the finish coat.

[↑ Back to Table of Contents](#)

Travel and Per Diem:

All Districts

No travel or per diem established.

PLUMBERS, PIPEFITTERS, AND STEAMFITTERS

	Wage	Benefit
District 1	\$36.13	\$16.01
District 2	\$37.90	\$16.45
District 3	\$37.90	\$16.45
District 4	\$35.21	\$20.21

Duties Include:

Assemble, install, alter, and repair pipe-lines or pipe systems that carry water, steam, air, other liquids or gases. Testing of piping systems, commissioning and retro-commissioning. Workers in this occupation may also install heating and cooling equipment and mechanical control systems.

Travel:

District 1

0-30 mi. free zone
>30-50 mi. \$35.00/day
>50-75 mi. \$45.00/day
>75 mi. \$100.00/day

Special Provision

If transportation is not provided, mileage at \$0.35/mi. for one trip out and one trip back is added to the amounts above. However, if the employee is traveling more than 75 miles/day, only subsistence at the rate of \$85.00/day is required.

Districts 2 & 3

0-45 mi. free zone
>45 mi.

- \$0.00/mi. in employer vehicle.
- \$0.65/mi. in employee vehicle.

Special Provision:

At the contractors' option, mileage for one trip out and one trip back per week may be paid plus subsistence at the rate of \$135.00/day.

District 4

0-70 free zone
>70 mi.

- On jobs when employees do not work consecutive days: \$0.55/mi. if employer doesn't provide transportation. Not to exceed two trips.
- On jobs when employees work any number of consecutive days: \$110.00/day.

[↑ Back to Table of Contents](#)

ROOFERS

	Wage	Benefit
District 1	\$28.22	\$13.01
District 2	\$23.01	\$10.41
District 3	\$23.01	\$10.41
District 4	\$23.00	\$ 9.16

Duties Include:

Metal roofing, covers roofs, walls and foundations with water proofing, insulation and vapor barriers in addition to metal flashings. Roofing includes shingles, low slope membranes, metal roofs, insulation, spray foam, coatings and vapor barriers. Wall coverings include metal panels, insulated metal panels and other waterproofing or rain screen systems. Foundation systems include waterproofing and insulation. Excludes prefabricated metal buildings.

Travel:

District 1

0-50 mi. free zone
>50 mi. \$0.35/mi.

District 2 and 3

0-35 mi. free zone
>35 mi. \$0.35/mi only when employer doesn't provide transportation in excess of the free zone.

District 4

0-50 mi. free zone
>50 mi. \$0.35/mi only when employer doesn't provide transportation.

Per Diem:

District 1

\$74.00/day

District 2 and 3

Employer pays for room + \$26.50/day.

District 4

Employer pays for room + \$26.50/day.
or
\$66.00/day.

[↑ Back to Table of Contents](#)

SHEET METAL WORKERS

	Wage	Benefit
District 1	\$33.00	\$20.73
District 2	\$33.00	\$20.73
District 3	\$33.00	\$20.73
District 4	\$33.00	\$20.73

Duties Include:

Testing and balancing, commissioning and retro-commissioning of all air-handling equipment and duct work. Manufacture, fabrication, assembling, installation, dismantling, and alteration of all HVAC systems, air conveyer systems, and exhaust systems. All lagging over insulation and all duct lining.

Travel:

All Districts

0-50 mi. free zone
>50 mi.

- \$0.25/mi. in employer vehicle.
- \$0.65/mi. in employee vehicle.

Per Diem:

All Districts

\$85/day

[↑ Back to Table of Contents](#)

SOLAR PHOTOVOLTAIC INSTALLERS

	Wage	Benefit
District 1	\$33.22	\$15.91
District 2	\$33.25	\$16.93
District 3	\$33.25	\$15.67
District 4	\$33.25	\$15.67

Travel:

District 1

No mileage due when traveling in employer's vehicle.

The following travel allowance is applicable when traveling in employee's vehicle:

- 0-15 mi. free zone
- >15-45 mi. \$0.625/mi. in excess of the free zone
- >45 mi. \$75.00/day

Districts 2, 3, and 4

No mileage due when traveling in employer's vehicle.

The following travel allowance is applicable when traveling in employee's vehicle:

- 0-08 mi. free zone
- >08-50 mi. federal mileage rate/mi. in excess of the free zone.
- >50 mi. \$71.57/day

[↑ Back to Table of Contents](#)

SPRINKLER FITTERS

	Wage	Benefit
District 1	\$38.66	\$24.29
District 2	\$37.96	\$24.29
District 3	\$38.66	\$24.29
District 4	\$35.66	\$24.29

Duties Include:

Duties Include but not limited to any and all fire protection systems: Installation, dismantling, inspection, testing, maintenance, repairs, adjustments, and corrections of all fire protection and fire control systems, including both overhead and underground water mains, all piping, fire hydrants, standpipes, air lines, tanks, and pumps used in connection with sprinkler and alarm systems.

Travel

All Districts

The following travel allowance is applicable when traveling in employee's vehicle.

- 0-60 mi. free zone
- >60-80 mi. \$21.00/day
- >80-100 mi. \$31.00/day
- >100 mi. \$115.00/day + the IRS rate per mile and \$8.92 for every 15 miles traveled for one trip out and one trip back

No travel allowance required when in employer's vehicle.

Per Diem

No per diem is applicable when traveling in employer's vehicle

The following per diem is applicable when traveling in employee's vehicle.

- 0-100 mi. free zone
- >100 mi. \$105.00/day + the IRS rate per mile and \$8.92 for every 15 miles traveled for one trip out and one trip back.
- >100 mi. \$115.00/day

[↑ Back to Table of Contents](#)

TAPERS

No Rate Established

[↑ Back to Table of Contents](#)

Travel and Per Diem:

All Districts

No travel or per diem established.

TELECOMMUNICATIONS EQUIPMENT INSTALLERS

	Wage	Benefit
District 1	\$25.84	\$ 3.14
District 2	\$24.60	\$11.00
District 3	\$24.60	\$11.08
District 4	\$21.25	\$11.08

Duties Include:

Install voice; sound; vision and data systems. This occupation includes burglar alarms, fire alarms, fiber optic systems, and video systems for security or entertainment

[↑ Back to Table of Contents](#)

Travel:

All Districts

The federal mileage rate/mi. in effect when travel occurs if using own vehicle.

Per Diem:

All Districts

\$75.00/day.

TERRAZZO WORKERS AND FINISHERS

No Rate Established

Duties Include:

Finish work on hard tile, marble, and wood tile to floors, ceilings, and roof decks

[↑ Back to Table of Contents](#)

Travel and Per Diem:

All Districts

No travel or per diem established.

TILE AND STONE SETTERS

No Rate Established

Duties Include:

Apply hard tile, stone, and comparable materials to walls, floors, ceilings, countertops, and roof decks.

[↑ Back to Table of Contents](#)

Travel and Per Diem:

All Districts

No travel or per diem established.

TRUCK DRIVERS

	Wage	Benefit
District 1	\$22.67	\$5.82
District 2	\$23.80	\$6.13
District 3	\$23.80	\$6.13
District 4	\$23.80	\$6.13

Truck drivers include but are not limited to:

Combination Truck & Concrete Mixer; Distributor Driver; Dry Batch Trucks; Dump Trucks & Similar Equipment; Flat Trucks; Lowboys, Four-Wheel Trailers, Float Semitrailer; Powder Truck Driver (Bulk Unloader Type); Servicemen; Service Truck Drivers, Fuel Truck Drivers, Tiremen; Trucks with Power Equipment; Truck Mechanic; Water Tank Drivers, Petroleum Product Drivers.

Zone Pay:
All Districts
No zone pay established.

[↑ Back to Table of Contents](#)

SECTION 011000 SUMMARY

1.1 PART 1 - GENERAL

- A. Related Documents
 - 1. Drawings and general provisions of Contract, including General Conditions, Supplemental Conditions and other Division 1 Specification Sections, apply to this Section.

- B. Project Description
 - 1. This project replaces the existing cage washer machine in Tietz Hall. The new machine will be designed by the manufacturer to fit into the existing space and utilize the existing floor pit. The cage washer will be purchased by the owner and constructed in place by the cage washer supplier. Modifications to the architectural, mechanical, electrical, and plumbing systems as indicated herein will be provided by the contractor under this contract.

- C. Site Information
 - 1. The project is primarily inside with some minor roof modifications. There is no other intended work on the outside of the building.

- D. Contracts
 - 1. Contracts shall be under one General Contract and shall include, but not be limited to, all labor, materials, and supervision necessary to furnish and install the Work.

- E. Work Sequence (responsible party)
 - 1. The work will be conducted to provide the least possible interference to the activities of the Owner's personnel and activities. The Contractor will have access to Tietz Hall from the date of receipt of the contract.
 - 1. Start work prep (by contractor).
 - a. Mobilize
 - b. Construct temporary walls
 - 2. Demo work (by contractor)
 - a. Remove existing cage washer and related systems.
 - b. Disconnect cage washer. See mechanical plans for specifics.
 - c. Demo/prep for existing pit and wash area modifications.
 - 4. Provide temporary HVAC systems (by contractor)
 - a. See mechanical plans for specifics.
 - 5. Make improvements to pit and cage wash area (by contractor)
 - a. Construct equipment supports
 - b. Install new surface for existing pit
 - c. Install stainless steel support covers
 - d. Modify cage washer area as indicated.
 - 6. Install new cage washer and related equipment (by vendor)
 - 7. Remove temporary wall. (by contractor)

- a. removal of temporary wall partitions to be coordinated with completion of dust and fume producing operations and with start-up / test and balance procedures
- 8. Reconnect and commission MEP systems (by contractor)
- 9. Commission cage washer (by vendor, supported by contractor/sub).
- 10. Install Panel wall system (by contractor)
- 11. Patch/ repair / trim / finish work (by contractor)

F. Contractor Use of Premises

- 1. Work on this contract is expected to be done during regular working hours Monday through Friday. Any variation from this will require prior approval of the Consultant and Owner.
- 2. All work must be coordinated with MSU at all times and MSU must be informed about any work impacting campus operations 72 hours or 3 working days in advance of work being conducted and shall require MSU approval.
- 3. General: Limit use of the premises to construction activities in areas indicated; allow for Owner/MSU occupancy and use by the public. Confine operations to areas within contract limits indicated. Portions of the site beyond areas in which construction operations are indicated are not to be disturbed.
- 4. Contractor shall conduct all his work in such a manner as to minimize the inconvenience and disruption of MSU's daily schedule.
- 5. Confine operations at the site to the areas permitted under the Contract. Portions of the site beyond areas on which work is indicated are not to be disturbed. Conform to site rules and regulations affecting the work while engaged in project construction.
- 6. Do not unreasonably encumber the site with materials or equipment. Confine stockpiling of materials to the areas designated on the drawings. If additional storage is necessary, obtain and pay for such storage off-site.
- 7. Contractor shall establish a staging area for storage of materials and equipment.
- 8. The Contractor is to coordinate with MSU for the location of the job site trailer office.
- 9. Keep driveways and entrances serving the premises clear and available to MSU and MSU's employees, staff and visitors at all times, unless otherwise agreed by MSU. Do not use these areas for parking or storage of materials. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on site.

G. Parking and Site Access

(See also Supplemental Conditions of the Contract for Construction.)

- 1. MSU Bozeman Vehicle Regulations state: "All students, faculty, staff, and visitors must register any motor vehicle they park on the University campus, for any reason. A visitor is anyone not defined as student, staff or faculty."
- 2. All Contractor and Contractor employees shall comply with Montana State University parking regulations. MSU parking permits can be purchased at

the University Police Office located in the Huffman Building at Seventh Avenue and Kagy Boulevard. Violators of MSU Bozeman Vehicle Regulations may be ticketed and towed.

3. A maximum of three (3) Contractor Permits (or as agreed with MSU) will be made available to the Contractor for parking of essential vehicles within the designated parking lot (as designated on the Cover Sheet of the Contract Documents). Essential vehicles are vehicles used for delivery of equipment and tools required to be parked in close proximity to the construction area. All allowed vehicles only to be parked on hard surfaced areas within the Staging Area. All other Contractor and Contractor employee vehicles on campus shall be parked in designated parking lots to be agreed with MSU. No personal vehicles shall be parked at the project site in any event. If a driver of a vehicle not allowed to be parked at the project site must unload equipment, tools, or materials, the vehicle must be immediately thereafter move to a designated lot or leave campus.
4. Access and egress to and from the project site shall be coordinated with the owner. In cases where a different route must be used for a specific purpose, permission must be obtained from MSU. Access routes are for delivery of equipment, tools, and materials and not for parking.
5. The site Staging Areas for materials and equipment are designated on the Cover Sheet of the Contract Documents. Staged materials and equipment must be secured on the ground surface or in trailers. Site staging areas shall be fenced in accordance with the Contract Documents. Vehicles in addition to those allowed to be parked may not be used for staging of equipment, tools, or materials.

H. Owner Occupancy

1. Full Owner/MSU Occupancy: The Owner/MSU will occupy the site during the entire construction period. Cooperate with MSU during construction operations to minimize conflicts and facilitate MSU usage. Perform the work so as not to interfere with MSU's operations.

I. Safety Requirements

1. General: The safety measures required by the Contract Documents are not meant to be inclusive. The Contractor shall be solely responsible for safety on a 24-hours-per-day, 7 days-per-week basis and shall take whatever additional measures are necessary to insure the health and safety of the buildings' occupants, or pedestrians at or near the construction site and access routes and of all other persons in all areas affected by the Contractor's activities. Prior to the start of construction, the Contractor is to submit to the Consultant, a detailed written plan specifying the safety procedures that will be followed. Include (but not by way of limitation) the following: Verbiage, size and locations of warning signs; construction sequence as related to safety; use of barricades (type and location); employee policies as related to safety; and delivery of materials as related to safety. Revise the safety plan as required during construction and resubmit to the Owner.
2. All application, material handling, and associated equipment shall conform to and be operated in conformance with OSHA safety requirements.

3. Comply with Federal, State, local, and the Owner's fire, health and safety requirements.
4. Advise MSU whenever work is expected to be hazardous or inconvenient (including objectionable odors) to MSU's employees, students, visitors or the building occupants.
5. Construction materials or equipment shall be placed so as not to endanger the work or prevent free access to all emergency devices or utility disconnects.
6. Maintain the proper rated fire extinguishers within easy access where power tools, sanding or other equipment is being used.
7. The Contractor shall erect and maintain, as required by law, conditions and progress of the work, warning signs, barricades and other reasonable safeguards for safety and protection.
8. **Emergency and Public Safety Alert System:**
Montana State University has an Emergency and Public Safety Alert System that warns the campus community in the event of an emergency or public safety event. Because contractors, consultants, and vendors are considered members of the campus community when working on campus, they must be familiar with the alert system and understand when the system is used. Montana State University requires all contractors, consultants, vendors, and their employees working on or entering the MSU-Bozeman campus to register for the Emergency and Public Safety Alert System. The link to register is: <http://www.montana.edu/msualert/>

J. Existing Premises Condition

1. The Contractor is responsible for adequately documenting in photos the existing condition of the premises, to include external road surfaces, curbing and landscaped areas, specifically the cleanliness of areas. Any damage to the premises which is found after construction and is not so documented will be the responsibility of the Contractor to repair or replace.

K. Discrepancies in the Documents

1. The Contractor shall bring any discrepancies between any portions of the drawings and specifications to the attention of the Owner and the Consultant in writing. The Owner and Consultant shall review the discrepancy and clarify the intent desired in the Contract Documents. Unless specifically directed otherwise, the Contractor shall be obligated to provide the greater quantity or quality without any change in contract sum or time.

END OF SECTION 011000

**SECTION 012000
PRICE AND PAYMENT PROCEDURES**

1.1 GENERAL

A. Related Documents

1. Drawings and general provisions of Contract, including General Conditions, Supplemental Conditions and other Division 1 Specification Sections, apply to this Section.

B. Summary

1. This Section specified administrative and procedural requirements governing the Contractor's Applications for Payment.
2. The Contractor's Construction Schedule and Submittal Schedule are included in Section "Submittals".

C. Schedule of Values

1. Coordinate preparation of the Schedule of Values, Form 100, with preparation of the Contractor's Construction Schedule.
2. Each prime Contractor shall coordinate preparation of its Schedule of Values for its part of the work with preparation of the Contractor's Construction Schedule.
3. Correlate line items in the Schedule of Values with other required administrative schedules and forms, including:
 - a. Contractor's construction schedule
 - b. Application for Payment form
 - c. List of subcontractors
 - d. Schedule of allowances
 - e. Schedule of alternates
 - f. List of products
 - g. List of principal suppliers and fabricators
 - h. Schedule of submittals
 - i. Submit the Schedule of Values to the Architect at the earliest feasible date, but in no case later than seven (7) days before the date scheduled for submittal of the initial Application for Payment.
 - j. Sub-Schedules: Where the work is separated into phases that require separately phased payments, provide sub-schedules showing values correlated with each phase of payment.
4. Format and Content: Use the Project Manual Table of Contents as a guide to establish the format for the Schedule of Values.
 - a. Identification: Include the following project identification on the Schedule of Values:
 - 1) Project name
 - 2) Name of the Architect
 - 3) Project number (PPA No.)
 - 4) Contractor's name and address
 - 5) Date of submittal

- b. Arrange the Schedule of Values in a tabular form with separate columns to indicate the following for each item listed:
 - 1) Generic name
 - 2) Related specification section
 - 3) Name of subcontractor
 - 4) Name of manufacturer or fabricator
 - 5) Name of supplier
 - 6) Change Orders (numbers) that have affected value
 - 7) Dollar value
 - a) Percentage of Contract Sum in the nearest one-hundredth percent, adjusted to total 100%
 - c. Provide a breakdown of the Contract Sum in sufficient detail to facilitate continued evaluation of Applications for Payment and progress reports. Break principal subcontract amounts down into several line items.
 - d. Round amounts off to the nearest whole dollar; the total shall equal the Contract Sum.
 - e. For each part of the work where an Application for Payment may include materials or equipment, purchased or fabricated and stored, but not yet installed, provide separate line items on the Schedule of Values for initial cost of the materials, for each subsequent stage of completion, and for total installed value of that art of the work.
5. Margins of Cost: Show line items for indirect costs, and margins on actual costs, only to the extent that such items will be listed individually in Applications for Payment. Each item in the Schedule of Values and Applications for Payment shall be complete including its total cost and proportionate share of general overhead and profit margin.
- a. At the Contractor's option, temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown as separate line items in the Schedule of Values or distributed as general overhead expense.
6. Schedule Updating: Update and resubmit the Schedule of Values when Change Orders or Construction Change Directives result in a change in the Contract Sum.

D. Applications for Payment

- 1. Each Application for Payment shall be consistent with previous applications and payments as certified by the Architect and paid for by the Owner. The initial Application for Payment, the Application for Payment at time of Substantial Completion, and the final Application for Payment involve additional requirements.
- 2. Payment Application Times: Each progress payment date is as indicated in the Agreement. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.
- 3. Payment Application Forms: Use Montana Form 101 as the form for Application for Payment.
- 4. Application Preparation: Complete every entry on the form, including notarization and execution by person authorized to sign legal documents on behalf of the Owner. Incomplete applications will be returned without action.

- a. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions have been made.
 - b. Include amounts of Change Orders and Construction Change Directives issued prior to the last day of the construction period covered by the application.
5. Transmittal: Submit one (1) executed copy of each Application for Payment to the Architect by means ensuring receipt within 24 hours, including waivers of lien and similar attachments, when required.
- a. Transmit each copy with a transmittal form listing attachments, and recording appropriate information related to the application in a manner acceptable to the Architect.
6. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of the first Application for Payment include the following:
- a. List of subcontractors
 - b. Schedule of Values
 - 1) Contractor's Construction Schedule (preliminary if not final)
 - c. Copies of building permits
 - 1) Copies of authorizations and licenses from governing authorities for performance of the work
 - d. Certificates of insurance and insurance policies (submitted with Contract)
 - e. Performance and payment bonds (submitted with Contract if required)
7. Application for Payment at Substantial Completion: Following issuance of the Certificate of Substantial Completion, submit an Application for Payment; this application shall reflect any Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the work.
8. Administrative actions and submittals that shall proceed or coincide with this application include:
- a. Occupancy permits and similar approvals
 - b. Warranties (guarantees) and maintenance agreements
 - c. Test/adjust/balance records
 - d. Maintenance instructions
 - e. Meter readings
 - f. Start-up performance reports
 - 1) Change-over information related to Owner's occupancy, use, operation and maintenance.
 - g. Final cleaning
 - 1) Application for reduction of retainage, and consent of surety

9. Final Payment Application: Administrative actions and submittals which must precede or coincide with submittal of the final Application for Payment include the following:
- a. Completion of project closeout requirements
 - 1) Completion of items specified for completion after Substantial Completion
 - b. Assurance that unsettled claims will be settled
 - 1) Assurance that work not complete and accepted will be completed without undue delay
 - 2) Transmittal of required project construction records to Owner

END OF SECTION 01200

**SECTION 012300
ALTERNATES**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions, Supplemental Conditions and other Division 1 Specification Sections, apply to this section. See also *Instructions to Bidders 10.3 Award of Bids*.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for alternates.

1.3 DEFINITIONS

- A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the Bidding Requirements that may be added to or deducted from the Base Bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.
 - 1. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.

1.4 PROCEDURES

- A. Coordination: Modify or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.
 - 1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.
- B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated modifications to alternates.
- C. Execute accepted alternates under the same conditions as other work of the Contract.
- D. Schedule: A Schedule of Alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

A. Description of Alternates

1. Alternate Number 1:
 - a. Install stainless steel wall panel enclosure system
 - b. Painting inside panel enclosure
 - c. Install lighting and switch
 - d. Add fire sprinkler
 - e. Install air transfer grille into panel enclosure system
 - f. Provide any other items indicated on the plans.

END OF SECTION

**SECTION 012500
SUBSTITUTION PROCEDURES**

PART 1 - GENERAL

- A. Related Documents
 - 1. Drawings and general provisions of Contract, including General Conditions, Supplemental Conditions and *Instructions to Bidders*.

- B. Substitution Procedures
 - 1. Substitutions include changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by the Contractor.
 - 2. Substitution Requests: Submit three copies of each request on MSU Substitution Request Form 099 for each consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - a. Submit requests in accordance with *Instructions to Bidders*.
 - b. Identify product to be replaced and show compliance with requirements for substitutions. Include a detailed comparison of significant qualities of proposed substitution with those of the Work specified, a list of changes needed to other parts of the Work required to accommodate proposed substitution, and any proposed changes in the Contract Sum or the Contract Time should the substitution be accepted.

- C. Architect will review proposed substitutions and notify Contractor of their acceptance or rejection. If necessary, Architect will request additional information or documentation of evaluation.
 - 1. Architect will notify Contractor of acceptance or rejection of proposed substitution within 10 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.

- D. Do not submit unapproved substitutions on Shop Drawings or other submittals.

END OF SECTION 012500

SECTION 013000

SUBMITTALS

1.1 GENERAL

A. Related Documents

1. Drawings and general provisions of Contract, including General Conditions, Supplemental Conditions and other Division 1 Specification Sections, apply to this Section.

B. Summary

1. This Section specifies administrative and procedural requirements for submittals required for performance of the work, including:
 - a. Contractor's construction schedule
 - b. Submittal schedule
 - c. Daily construction reports
 - d. Shop Drawings
 - e. Product data
 - f. Samples

Note: All Submittals are to be both print and electronic.

2. Administrative Submittals: Refer to other Division 1 Sections and other Contract Documents for requirements for administrative submittals. Such submittals include, but are not limited to:
 - a. Permits
 - b. Applications for Payment
 - c. Performance and payment bonds
 - d. Insurance certificates
 - e. List of Subcontractors
3. The Schedule of Values submitted is included in Section "Applications for Payment".
4. Inspection and test reports are included in Section "Quality Requirements".
5. Unless otherwise instructed by the Owner all submittals shall be directed to Architect/Engineer Consultant of Record. The Contractor's construction schedule, submittal schedule and daily construction reports shall be directed to the Consultant's representative, the State of Montana's representative and MSU's representative. Shop drawings, product data and samples shall be directed to the Consultant's representative.

C. Submittal Procedures

1. Coordination: Coordinate preparation and processing of submittals with performance of construction activities. Transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay.
 - a. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals and related activities that require sequential activity.

- b. Coordinate transmittal of different types of submittals for related elements of the work so processing will not be delayed by the need to review submittals concurrently for coordination.
 - 1) The Consultant reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
 - c. Processing: Allow sufficient review time so that installation will not be delayed as a result of the time required to process submittals, including time for resubmittals.
 - 1) Allow two (2) weeks for initial review. Allow additional time if processing must be delayed to permit coordination with subsequent submittals. The Consultant will promptly advise the Contractor when a submittal being processed must be delayed for coordination.
 - 2) If an intermediate submittal is necessary, process the same as the initial submittal.
 - 3) Allow two (2) weeks for reprocessing each submittal.
 - 4) No extension of contract time will be authorized because of failure to transmit submittals to the Consultant sufficiently in advance of the work to permit processing.
2. Submittal Preparation: Place a permanent label or title block on each submittal for identification. Indicate the name of the entity that prepared each submittal on the label or title block.
- a. Provide a space approximately 4" x 5" on the label or beside the title block on Shop Drawings to record the Contractor's review and approval markings and the action taken.
 - b. Include the following information on the label for processing and recording action taken.
 - 1) Project name and PPA Number
 - 2) Date
 - 3) Name and address of Consultant
 - 4) Name and address of Contractor
 - 5) Name and address of Subcontractor
 - 6) Name and address of supplier
 - 7) Name of manufacturer
 - a) Number and title of appropriate Specification Section
 - b) Drawing number and detail references, as appropriate
3. Submittal Transmittal: Package each submittal appropriately for transmittal and handling. Transmit each submittal from Contractor to Consultant using a transmittal form. Submittals received from sources other than the Contractor will be returned without action.
- a. On the transmittal record relevant information and requests for data. On the form, or separate sheet, record deviations from Contract Document requirements, including minor variations and limitations. Include

Contractor's certification that information complies with Contract Documents requirements.

- b. Transmittal Form: Contractor's standard form.

D. Contractor's Construction Schedule

1. Bar-Chart Schedule: Prepare a fully developed, horizontal bar-chart type Contractor's construction schedule. Submit both in print and electronically within thirty (30) days of the date established for "Commencement of the Work".
 - a. Provide a separate time bar for each significant construction activity. Provide a continuous vertical line to identify the first working day of each week. Use the same breakdown of units of the work as indicated in the "Schedule of Values".
 - b. Within each time bar indicate estimated completion percentage in 10 percent increments. As work progresses, place a contrasting mark in each bar to indicate actual completion.
 - c. Prepare the schedule on a sheet, or series of sheets, of stable transparency, or other reproducible media, of sufficient width to show data for the entire construction period.
 - d. Secure time commitments for performing critical elements of the work from parties involved. Coordinate each element on the schedule with other construction activities; include minor elements involved in the sequence of the work. Show each activity in proper sequence. Indicate graphically sequences necessary for completion of related portions of the work.
 - e. Coordinate the Contractor's construction schedule with the schedule of values, list of subcontracts, submittal schedule, progress reports, payment requests, and other schedules.
 - f. Indicate completion in advance of the date established for Substantial Completion. Indicate Substantial Completion on the schedule to allow time for the Consultant's procedures necessary for certification of Substantial Completion.
2. Work Stages: Indicate important stages of construction for each major portion of the Work, including testing and installation.
3. Area Separations: Provide a separate time bar to identify each major construction area for each major portion of the work. Indicate where each element in an area must be sequenced or integrated with other activities.
4. Cost Correlation: At the head of the schedule, provide a two (2) item cost correlation line, indicating "pre-calculated" and "actual" costs. On the line show dollar-volume of work performed as of the dates used for preparation of payment requests.
 - a. Refer to Section "Price and Payment Procedures" for cost reporting and payment procedures.
5. Distribution: Following response to the initial submittal, print and distribute copies to the Consultant, Owner, subcontractors, and other parties required to comply with scheduled dates. Transmit electronically and post copies in the project meeting room and temporary field office.
 - a. When revisions are made, distribute to the same parties and post in the same locations. Delete parties from distribution when they have

completed their assigned portion of the work and are no longer involved in construction activities.

6. Schedule Updating: Revise the schedule after each meeting or activity, where revisions have been recognized or made. Issue the updated schedule electronically and in print concurrently with report of each meeting.

E. Submittal Schedule

1. After development and acceptance of the Contractor's construction schedule, prepare a complete schedule of submittals. Submit the schedule within ten (10) days of the date required for establishment of the Contractor's construction schedule.
 - a. Coordinate submittal schedule with the list of subcontracts, schedule of values and the list of products, as well as the Contractor's construction schedule.
 - b. Prepare the schedule in chronological order; include submittals required during the first thirty (30) or sixty (60) days of construction. Provide the following information:
 - 1) Scheduled date for the first submittal
 - 2) Related section number
 - 3) Submittal category
 - 4) Name of subcontractor
 - 5) Description of the part of the work covered
 - 6) Scheduled date for resubmittal
 - a) Scheduled date the Consultant's final release or approval
2. Distribution: Following response to initial submittal, print and distribute copies to the Consultant, Owner, subcontractors, and other parties required to comply with submittal dates indicated. Post copies in the project meeting room and field office.
 - a. When revisions are made, distribute to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the work and are no longer involved in construction activities.
3. Schedule Updating: Revise the schedule after each meeting or activity, where revisions have been recognized or made. Issue the updated schedule concurrently with report of each meeting.

F. Daily Construction Reports

1. Prepare a daily construction report, recording the following information concerning events at the site; and submit duplicate copies to the Consultant at weekly intervals:
 - a. List of subcontractors at the site
 - b. Approximate count of personnel at the site
 - c. High and low temperatures, general weather conditions
 - d. Accidents and unusual events
 - e. Meetings and significant decisions

- f. Stoppages, delays, shortages, losses
- g. Meter readings and similar recordings
- h. Emergency procedures
- i. Orders and requests of governing authorities
- j. Change Orders received, implemented
- k. Services connected, disconnected
- l. Equipment or system tests and start-ups
- m. Partial completions, occupancies
- n. Substantial Completions authorized

G. Shop Drawings

1. Submit newly prepared information, drawn to accurate scale. Highlight, encircle, or otherwise indicate deviations from the Contract Documents. Do not reproduce Contract Documents or copy standard information as the basis of Shop Drawings. Standard information prepared without specific reference to the project is not considered Shop Drawings.
2. Shop Drawings include fabrication and installation drawings, setting diagrams, schedules, patterns, templates, and similar drawings. Include the following information:
 - a. Dimensions
 - b. Identification of products and materials included
 - c. Compliance with specified standards
 - d. Notation of coordination requirements
 - e. Notation of dimensions established by field measurement
 - f. Sheet Size: Except for templates, patterns and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2" x 11", but no larger than 36" x 48".
 - g. Submittal: Submit electronically and in print for the Consultant's review; Consultant's comments will be returned electronically.
 - 1) One (1) of the prints returned shall be marked-up and maintained as a "Record Document".
 - k. Do not use Shop Drawings without an appropriate final stamp indicating action taken in connection with construction.
3. Coordination drawings are a special type of Shop Drawing that show the relationship and integration of different construction elements that require careful coordination during fabrication or installation to fit in the space provided or function as intended.
 - a. Preparation of coordination drawings is specified in section "Project Coordination" and may include components previously shown in detail on Shop Drawings or Product Data.
 - b. Submit coordination drawings for integration of different construction elements. Show sequences and relationships of separate components to avoid conflicts in use of space.

H. Product Data

1. Collect Product Data into a single submittal for each element of construction or system. Product Data includes printed information such as manufacturer's

installation instructions, catalog cuts, standard color charts, roughing-in diagrams and templates, standard wiring diagrams, and performance curves. Where Product Data must be specially prepared because standard printed data is not suitable for use, submit as "Shop Drawings".

- a. Mark each copy to show applicable choices and options. Where printed Product Data includes information on several products, some of which are not required, mark copies to indicate the applicable information. Include the following information:
 - 1) Manufacturer's printed recommendations
 - a) Compliance with recognized trade association standards
 - b) Compliance with recognized testing agency standards
 - 2) Application of testing agency labels and seals
 - a) Notation of dimensions verified by field measurement
 - 3) Notation of coordination requirements
- b. Do not submit Product Data until compliance with requirements of the Contract Documents has been confirmed.
- c. Preliminary Submittal: Submit a preliminary single-copy of Product Data where selection of options is required.
- d. Submittals: Submit two (2) copies of each required submittal; submit four (4) copies where required for maintenance manuals. The Consultant will retain one (1), and will return the other marked with action taken and corrections or modifications required.
 - 1) Unless non-compliance with Contract Document provisions is observed, the submittal may serve as the final submittal.
- e. Distribution: Furnish copies of final submittal to installers, subcontractors, suppliers, manufacturers, fabricators, and others required for performance of construction activities. Show distribution on transmittal forms.
 - 1) Do not proceed with installation until an applicable copy of Product Data applicable is in the installer's possession.
 - 2) Do not permit use of unmarked copies of Product Data in connection with construction.

I. Samples

1. Submit full-size, fully fabricated samples cured and finished as specified and physically identical with the material or product proposed. Samples include partial sections of manufactured or fabricated components, cuts or containers of materials, color range sets, and swatches showing color, texture, and pattern.
 - a. Mount, display, or package samples in the manner specified to facilitate review of qualities indicated. Prepare samples to match the Consultant's sample. Include the following:
 - 1) Generic description of the sample
 - 2) Sample source
 - 3) Product name or name of manufacturer

- 4) Compliance with recognized standards
 - 5) Availability and delivery time
2. Submit samples for review of kind, color, pattern, and texture, for a final check of these characteristics with other elements, and for a comparison of these characteristics between the final submittal and the actual component as delivered and installed.
 - a. Where variation in color, pattern, texture, or other characteristics are inherent in the material or product represented, submit multiple units (not less than three (3), that show approximate limits of the variations.
 - b. Refer to other specification sections for requirements for samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation and similar construction characteristics.
 - c. Refer to other sections for samples to be returned to the Contractor for incorporation in the work. Such samples must be undamaged at time of use. On the transmittal, indicate special requests regarding disposition of sample submittals.
 3. Preliminary Submittals: Where samples are for selection of color, pattern, texture, or similar characteristics from a range of standard choices, submit a full set of choices for the material or product.
 - a. Preliminary submittals will be reviewed and returned with the Consultant's mark indicating selection and other action.
 4. Submittals: Except for samples illustrating assembly details, workmanship, fabrication techniques, connections, operation and similar characteristics, submit three (3) sets; one (1) will be returned marked with the action taken.
 - a. Maintain sets of samples, as returned, at the project site, for quality comparisons throughout the course of construction.
 - 1) Unless non-compliance with Contract Document provisions is observed, the submittal may serve as the final submittal.
 - 2) Sample sets may be used to obtain final acceptance of the construction associated with each set.
 5. Distribution of Samples: Prepare and distribute additional sets to subcontractors, manufacturers, fabricators, suppliers, installers, and others as required for performance of the work. Show distribution on transmittal forms.
 - a. Field samples specified in individual sections are special types of samples. Field samples are full-size examples erected on site to illustrate finishes, coatings, or finish materials and to establish the standard by which the work will be judged.
 - 1) Comply with submittal requirements to the fullest extent possible. Process transmittal forms to provide a record of activity.

J. Consultant's Action

1. Except for submittals for record, information, or similar purposes, where action and return is required or requested, the Consultant will review each submittal, mark to indicate action taken, and return promptly. Compliance with specified characteristics is the Contractor's responsibility.
2. Action Stamp: The Consultant will stamp each submittal with a uniform, self-explanatory action stamp. The stamp will be appropriately marked, as follows, to indicate the action taken:
 - a. Final-But-Restricted Release: When submittals are marked "Make Corrections Noted", that part of the work covered by the submittal may proceed provided it complies with notations or corrections on the submittal and requirements of the Contract Documents; final acceptance will depend on that compliance.
 - b. Returned for Resubmittal: When submittal is marked "Revise and Resubmit", do not proceed with that part of the work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal in accordance with the notations; resubmit without delay. Repeat if necessary to obtain a different action mark.
 - 1) Do not permit submittals marked "Revise and Resubmit" to be used at the project site, or elsewhere where work is in progress.
 - c. Other Action: Where a submittal is primarily for information or record purposes, special processing or other activity, the submittal will be returned, marked "Action not Required".

END OF SECTION 013000

SECTION 013100
PROJECT COORDINATION

1.1 GENERAL

- A. Related Documents
 - 1. Drawings and general provisions of Contract, including General Conditions and Supplemental Conditions and other Division1 Specification Sections, apply to this Section.

- B. Summary
 - 1. This section specifies administrative and supervisor requirements necessary for project coordination including, but not necessarily limited to:
 - a. Coordination
 - b. Administrative and supervisory personnel
 - c. General installation provisions
 - d. Cleaning and protection
 - 2. Field Engineering is included in Section "Field Engineering".
 - 3. Progress meetings, coordination meetings and pre-installation conferences are included in Section "Project Meetings".
 - 4. Requirements for Contractor's Construction Schedule are included in Section "Submittals".

- C. Coordination
 - 1. Coordination: Coordinate construction activities included under various sections of these specifications to assure efficient and orderly installation of each part of the work. Coordinate construction operations included under different sections of the specifications that are dependent upon each other for proper installation, connection, and operation.
 - a. Provide access to work at all times for inspections by Owner and authorized representatives.
 - b. Provide safe working conditions and protection of completed work.
 - c. Provide barricades and signs.
 - d. Where installation of one part of the work is dependent on installation of other components, either before or after its own installation, schedule construction activities in the sequence required to obtain the best results.
 - e. Where availability of space is limited, coordinate installation of different components to assure maximum accessibility for required maintenance, service and repair.
 - f. Make adequate provisions to accommodate items scheduled for later installation.
 - g. Where necessary, prepare memoranda for distribution to each party involved outlining special procedures required for coordination. Include such items as required notices, reports, and attendance at meetings.
 - 1) Prepare similar memoranda for the Owner and separate Contractors where coordination of their work is required.
 - 2. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and ensure orderly progress of the work. Such administrative activities include, but are not limited to, the following:

- a. Notify Facilities Services or Campus Planning, Design and Construction of any expected disruptions in service or changes in construction schedule at least 72 hours (3 working days) in advance.
 - b. Preparation of schedules.
 - c. Installation and removal of temporary facilities.
 - d. Delivery and processing of submittals.
 - e. Progress meetings.
 - f. Project close-out activities.
3. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials.
- a. Salvage materials and equipment involved in performance of, but not actually incorporated in, the work. Refer to other sections for disposition of salvaged materials that are designated as Owner's property.
- D. Submittals
- 1. Coordinated Drawings: Prepare and submit coordination drawings where close and careful coordination is required for installation of products and materials fabricated off-site by separate entities, and where limited space availability necessitates maximum utilization of space for efficient installation of different components.
 - a. Show the interrelationship of components shown on separate shop drawings.
 - b. Indicate required installation sequences.
 - c. Comply with requirements contained in Section "Submittals".
 - d. Section "Basic Electrical Requirements" for specific coordination drawing requirements for mechanical and electrical installations.
 - 2. Staff Names: Within 15 days of Notice to Proceed, submit a list of the Contractor's principal staff assignments, including the Superintendent and other personnel in attendance at the site; identify individuals, their duties and responsibilities; list their addresses and telephone numbers. Post copies of the list in the project meeting room, the temporary field office, and each temporary telephone.

1.2 PROJECT MEETINGS

- A. Related Documents
- 1. Drawings and general provisions of the Contract, including General and Supplementary General Conditions and other Division 1 Specification Sections, apply to this Section.
- B. Summary
- 1. This section specifies administrative and procedural requirements for project meetings including but not limited to:
 - a. Pre-construction conference
 - b. Pre-installment conferences
 - c. Coordination meetings
 - d. Progress meetings
- C. Pre-construction Conference
- 1. Schedule a pre-construction conference and organizational meeting.
 - a. Hold meeting at the project site or other convenient location and prior to commencement of construction activities, including the moving of

equipment on to the site. Conduct the meeting to review responsibilities and personnel assignments.

2. Attendees: The Owner, Consultant and their consultants, the Contractor and its superintendent, major subcontractors, manufacturers, suppliers and other concerned parties shall each be represented at the conference by persons familiar with and authorized to conclude matters relating to the work. Both the Contractor and the Contractor's job foremen shall attend the meeting, along with all subcontractors.
3. Agenda: Discuss items of significance that could affect progress including such topics as:
 - a. Tentative construction schedule
 - b. Critical work sequencing
 - c. Designation of responsible personnel
 - d. Procedures for processing field decisions and Change Orders
 - e. Procedures for processing Applications for Payment
 - f. Distribution of Contract Documents
 - g. Submittal of Shop Drawings, Product Data and Samples
 - h. Preparation of record documents
 - i. Use of the premises
 - j. Office, work and storage areas
 - k. Equipment deliveries and priorities
 - l. Safety procedures
 - m. First aid
 - n. Security
 - o. Housekeeping
 - p. Working hours

D. Pre-Installation Conferences

1. Conduct a pre-installation conference at the site before each construction activity that requires coordination with other construction. The Installer and representatives of manufacturers and fabricators involved in or affected by the installation, and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise the Consultant of scheduled meeting dates.
2. Review the progress of other construction activities and preparations for the particular activity under consideration at each pre-installation conference, including requirements for:
 - a. Contract Documents
 - b. Options
 - c. Related Change Orders
 - d. Purchases
 - e. Deliveries
 - f. Shop Drawings, Product Data and quality control samples
 - g. Possible conflicts
 - h. Compatibility problems
 - i. Time schedules
 - j. Weather limitations
 - k. Manufacturer's recommendations
 - l. Compatibility of materials
 - m. Acceptability of substrates
 - n. Temporary facilities
 - o. Space and access limitations
 - p. Governing regulations

- q. Safety
 - r. Inspection and testing requirements
 - s. Required performance results
 - t. Recording requirements
 - u. Protection
3. The Consultant will record significant discussions and agreements and disagreements of each conference, along with the approved schedule. Distribute the record of the meeting to everyone concerned, promptly, including the Owner and Consultant.
 4. Do not proceed if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of work and reconvene the conference at the earliest feasible date.
- E. Coordination Meeting
1. Conduct project coordination meetings at regularly scheduled times convenient for all parties involved. Project coordination meetings are in addition to specific meetings held for other purposes, such as regular progress meetings and special pre-installation meetings.
 2. Request representation at each meeting by every party currently involved in coordination or planning for the construction activities involved.
 3. The Consultant will record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.
- F. Progress Meetings
1. Conduct progress meetings at the project site at regularly scheduled intervals. Coordinate with the Owner and Consultant of scheduled meeting dates. Coordinate dates of meetings with preparation of the payment request.
 2. Attendees: In addition to representatives of the Owner and Consultant, each subcontractor, supplier, or other entity concerned with current progress or involved in planning, coordination or performance of future activities shall be represented at these meetings by persons familiar with the project and authorized to conclude matters relating to progress.
 3. Agenda: Visit job site to raise specific pending issues prior to meeting. Review and correct or approve minutes of the previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to the current status of the project.
 - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine where each activity is in relation to the Contractor's Construction Schedule, whether on time or ahead or behind schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the contract time.
 - b. Review the present and future needs of each entity present, including such items as:
 - 1) Interface requirements
 - 2) Time
 - 3) Sequences
 - 4) Deliveries
 - 5) Off-site fabrication problems
 - 6) Access
 - 7) Site utilization

- 8) Temporary facilities and services
 - 9) Hours of work
 - 10) Hazards and risks
 - 11) Housekeeping
 - 12) Quality and work standards
 - 13) Change Orders
 - 14) Documentation of information for payment requests
4. Reporting: The Consultant shall distribute printed and electronic copies of minutes of the meeting to each party present and to other parties who should have been present. Include a brief summary, in narrative form, of progress since the previous meeting and report.
- a. Schedule Updating: Revise the construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue the revised schedule concurrently with the report of each meeting.

1.3 PRODUCTS (NOT APPLICABLE)

1.4 EXECUTION

A. General Installation Provisions

1. Inspection of Conditions: Require the installer of each major component to inspect both the substrate and conditions under which work is to be performed. Do not proceed until unsatisfactory conditions have been corrected in an acceptable manner.
2. Manufacturer's Instructions: Comply with manufacturer's installation instructions and recommendations, to the extent that those instructions and recommendations are more explicit or stringent than requirements contained in Contract Documents.
3. Inspect materials or equipment immediately upon delivery and again prior to installation. Reject damaged and defective items.
4. Provide attachment and connection devices and methods necessary for securing work. Secure work true to line and level. Allow for expansion and building movement.
5. Visual Effects: Provide uniform joint widths in exposed work. Arrange joints in exposed work to obtain the best visual effect. Refer questionable choices to the Consultant for final decision.
6. Recheck measurements, quantities and dimensions, before starting each installation.
7. Install each component during weather conditions and project status that will ensure the best possible results. Isolate each part of the completed construction from incompatible material as necessary to prevent deterioration.
8. Coordinate temporary enclosures with required inspections and tests, to minimize the necessity of uncovering completed construction for that purpose.
9. Mounting Heights: Where mounting heights are not indicated, install individual components at standard mounting heights recognized within the industry for the particular application indicated and in compliance with accessibility requirements. Refer questionable mounting height decisions to the Consultant for final decision.

B. Cleaning and Protection

1. During handling and installation, clean and protect construction in progress and adjoining materials in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

2. Clean and maintain completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
3. Limiting Exposures: Supervise construction activities to ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period. Where applicable, such exposures include, but are not limited to, the following:
 - a. Excessive static or dynamic loading
 - b. Excessive internal or external pressures
 - c. Excessively high or low temperatures
 - d. Thermal shock
 - e. Excessively high or low humidity
 - f. Air contamination or pollution
 - g. Water or ice
 - h. Solvents
 - i. Chemicals
 - j. Light
 - k. Radiation
 - l. Puncture
 - m. Abrasion
 - n. Heavy traffic
 - o. Soiling, staining and corrosion
 - p. Bacteria
 - q. Rodent and insect infestation
 - r. Combustion
 - s. Electrical current
 - t. High speed operation
 - u. Improper lubrication
 - v. Unusual wear or other misuse
 - w. Contact between incompatible materials
 - x. Destructive testing
 - y. Misalignment
 - z. Excessive weathering
 - aa. Unprotected storage
 - ab. Improper shipping or handling
 - ac. Theft
 - ad. Vandalism

END OF SECTION 013100

SECTION 014000
QUALITY REQUIREMENTS

1.1 GENERAL

A. RELATED DOCUMENTS

1. Drawings and general provisions of Contract, including General Conditions, Supplemental Conditions and other Division-1 Specification Sections, apply to this Section.

B. SUMMARY

1. This Section specifies administrative and procedural requirements for quality control services.
2. Quality control services include inspections and tests and related actions including reports, performed by independent agencies, governing authorities, and the Contractor. They do not include Contract enforcement activities performed by the Architect.
3. Inspection and testing services are required to verify compliance with requirements specified or indicated. These services do not relieve the Contractor of responsibility for compliance with Contract Document requirements.
4. Requirements of this Section relate to customized fabrication and installation procedures, not production of standard products.
 - a. Specific quality control requirements for individual construction activities are specified in the Sections that specify those activities. Those requirements, including inspections and tests, cover production of standard products as well as customized fabrication and installation procedures.
 - b. Inspections, test and related actions specified are not intended to limit the Contractor's quality control procedures that facilitate compliance with Contract Document requirements.
 - c. Requirements for the Contractor to provide quality control services required by the Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.

C. RESPONSIBILITIES

1. Contractor Responsibilities: The Contractor shall provide inspections, tests and similar quality control services, specified in individual Specification Sections and required by governing authorities, except where they are specifically indicated to be the Owner's responsibility, or are provided by another identified entity; these services include those
 - a. Services specified to be performed by an independent agency and not by the Contractor. Costs for these services shall be included in the Contract Sum.
 - b. The Contractor shall employ and pay an independent agency, to perform specified quality control services.
 - c. The Owner will engage and pay for the services of an independent agency

to perform inspections and tests specified as the Owner's responsibility. Payment for these services will be made by the Owner.

- d. Where the Owner has engaged a testing agency or other entity for testing and inspection of a part of the Work, and the Contractor is also required to engage an entity for the same or related element, the Contractor shall not employ the entity engaged by the Owner, unless otherwise agreed in writing with the Owner.
2. Retesting: The Contractor is responsible for retesting where results of required inspections, tests or similar services provide unsatisfactory and do not indicate compliance with Contract Document requirements, regardless of whether the original test was the Contractor's responsibility.
 - a. Cost of retesting construction revised or replaced by the Contractor is the Contractor's responsibility, where required tests were performed on original construction.
 3. Associated Services: The Contractor shall cooperate with agencies performing required inspections, tests and similar services and provide reasonable auxiliary services as requested. Notify the agency sufficiently in advance of operations to permit assignment of personnel. Associated services required include but are not limited to:
 - a. Providing access to the Work and furnishing incidental labor and facilities necessary to facilitate inspections and tests.
 - b. Taking adequate quantities of representative samples of materials that require testing or assisting the agency in taking samples.
 - c. Providing facilities for storage and curing of test samples, and delivery of samples to testing laboratories.
 - d. Providing the agency with a preliminary design mix proposed for use for materials mixes that require control by the testing agency.
 - e. Security and protection of samples and test equipment at the Project site.
 4. Owner Responsibilities: The Owner will provide inspections, tests and similar quality control services specified to be performed by independent agencies and not by the Contractor, except where they are specifically indicated as the Contractor's responsibility or are provided by another identified entity. Costs for these services are not included in the Contract Sum.
 - a. The Owner will employ and pay for the services of an independent agency, testing laboratory or other qualified firm to perform services which are the Owner's responsibility.
 5. Duties of the Testing Agency: The independent testing agency engaged to perform inspections, sampling and testing of materials and construction specified in individual Specification Sections shall cooperate with the Architect and Contractor in performance of its duties, and shall provide qualified personnel to perform required inspections and tests.
 - a. The agency shall notify the Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.

- b. The agency is not authorized to release, revoke, alter or enlarge requirements of the Contract Documents, or approve or accept any portion of the Work.
 - c. The agency shall not perform any duties of the Contractor.
6. Coordination: The Contractor and each agency engaged to perform inspections, tests and similar services shall coordinate the sequence of activities to accommodate required services with a minimum of delay. In addition the Contractor and each agency shall coordinate activities to avoid the necessity of removing and replacing construction to accommodate inspections and tests. The Contractor is responsible for scheduling times for inspections, tests, taking samples and similar activities.

D. SUBMITTALS

- 1. The independent testing agency shall submit a certified written report and electronic copy of each inspection, test or similar service, to the Architect, in duplicate, unless the Contractor is responsible for the service. If the Contractor is responsible for the service, submit a certified written report of each inspection, test or similar service through the Contractor, in duplicate.
 - a. Submit additional copies of each written report directly to the governing authority, when the authority so directs.
 - b. Report Data: Written reports of each inspection, test or similar service shall include, but not be limited to:
 - 1) Date of issue
 - 2) Project title and number
 - 3) Name, address and telephone number of testing agency
 - 4) Dates and locations of samples and tests or inspections
 - 5) Names of individuals making the inspection or test
 - 6) Designation of the Work and test method
 - 7) Identification of product and Specification Section
 - 8) Complete inspection or test data
 - 9) Test results and in interpretations of test results
 - 10) Ambient conditions at the time of sample-taking and testing
 - 11) Comments or professional opinion as to whether inspected or tested Work complies with Contract Document requirements
 - 12) Name and signature of laboratory inspector
 - 13) Recommendations on retesting

E. QUALITY ASSURANCE

- 1. Qualification for Service Agencies: Engage inspection and testing service agencies, including independent testing laboratories, which are prequalified as complying with "Recommended Requirements for Independent Laboratory Qualification" by the American Council of Independent Laboratories, and which specialize in the types of inspections and tests to be performed.
- 2. Each independent inspection and testing agency engaged on the Project shall be authorized by authorities having jurisdiction to operate in the State of Montana.

1.2 PRODUCTS (NOT APPLICABLE)

1.3 EXECUTION

A. GENERAL

1. Upon completion of inspection, testing, sample-taking and similar services, repair damaged construction and restore substrates and finishes to eliminate deficiencies, including deficiencies in visual qualities of exposed finishes.
2. Protect construction exposed by or for quality control service activities, and protect repaired construction.
3. Repair and protection is the Contractor's responsibility, regardless of the assignment of responsibility for inspection, testing or similar services.

END OF SECTION 014000

SECTION 015000
TEMPORARY FACILITIES AND UTILITIES

1.1 GENERAL

A. RELATED DOCUMENTS

1. Drawings and general provisions of the Contract, including General Conditions and Supplemental Conditions and other Division-1 Specification Sections, apply to this Section.

B. SUMMARY

1. This Section specifies requirements for temporary services and facilities, including utilities, construction and support facilities, security and protection.
2. Temporary utilities required may include but are not limited to:
 - a. Telephone service
 - b. Electric Service
 - c. Water
 - d. Natural gas
 - e. Sewer
3. Temporary construction and support facilities required may include but are not limited to:
 - a. Field offices and storage sheds.
 - b. Sanitary facilities, including drinking water
 - c. Temporary Project identification signs and bulletin boards
 - d. Waste Disposal services
 - e. Construction aids and miscellaneous services and facilities
4. Security and protection facilities required include but are not limited to:
 - a. Temporary Security Fencing
 - b. Temporary fire protection
 - b. Barricades, warning signs, lights
 - c. Environmental protection

C. QUALITY ASSURANCE

1. Regulations: Comply with industry standards and applicable laws and regulations if authorities having jurisdiction, including but not limited to:
 - a. Building Code requirements
 - b. Health and safety regulations
 - c. Utility company regulations
 - d. Police, Fire Department and Rescue Squad rules
 - e. Environmental protection regulations
2. Standards: Comply with NFPA Code 241, "Building Construction and

Demolition Operations" and ANSI-A10 Series standards for "Safety Requirements for Construction and Demolition".

D. PROJECT CONDITIONS

1. Conditions of Use: Keep temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Take necessary fire prevention measures. Do not overload facilities, or permit them to interfere with progress. Do not allow hazardous dangerous or unsanitary conditions, or public nuisances to develop or persist on the site.

1.2 PRODUCTS

A. MATERIALS

1. General: Provide new materials; if acceptable to the Architect, undamaged previously used materials in serviceable condition may be used. Provide materials suitable for the use intended.
2. Water: Provide potable water approved by local health authorities.
3. Open-Mesh Fencing: Provide 11-gage, galvanized 2-inch, chain link fabric fencing 6-feet high with galvanized barbed wire top strand and galvanized steel pipe posts, 1 1/2" I.D. for line posts and 2-1/2" I.D. for corner posts.

B. EQUIPMENT

1. General: Provide new equipment; if acceptable to the Architect, undamaged, previously used equipment in serviceable condition may be used. Provide equipment suitable for use intended.
2. Water Hoses: Provide 3/4" heavy-duty, abrasion-resistant, flexible rubber hoses 100 ft. long, with pressure rating greater than the maximum pressure of the water distribution system; provide adjustable shut-off nozzles at hose discharge.
3. Electrical Outlets: Provide properly configured NEA polarized outlets to prevent insertion of 110-120 volt plugs into higher voltage outlets. Provide receptacle outlets equipped with ground-fault circuit interrupters, reset button and pilot light, for connection of power tools and equipment.
4. Electrical Power Cords: Provide grounded extension cords; use "hard-service" cords where exposed to abrasion and traffic. Provide waterproof connectors to connect separate lengths of electric cords, if single lengths will not reach areas where construction activities are in progress.
5. Lamps and Light Fixtures: Provide general service incandescent lamps of wattage required for adequate illumination. Provide guard cages or tempered glass enclosures, where exposed to breakage. Provide exterior fixtures where exposed to moisture.
6. Temporary Offices: Provide prefabricated or mobile units or similar job-built construction with lockable entrances, operable windows and serviceable finishes. Provide heated and air-conditioned units on foundations adequate for normal loading.
7. Temporary Toilet Units: Provide self-contained single-occupant toilet units of the chemical, aerated recirculation, or combustion type, properly vented and fully enclosed with a glass fiber reinforced polyester shell or similar nonabsorbent

material.

9. First Aid Supplies: Comply with governing regulations.
10. Fire Extinguishers: Provide hand-carried, portable UL-rated, class "A" fire extinguishers for temporary offices and similar spaces. In other locations provide hand carried, portable, UL-rated, class "ABC" dry chemical extinguishers, or a combination of extinguishers of NFPA recommended classes for the exposures.
 - a. Comply with NFPA 10 and 241 for classification, extinguishing agent and size required by location and class of fire exposure.

1.3 EXECUTION

A. INSTALLATION

1. Use qualified personnel for installation of temporary facilities. Locate facilities where they will serve the Project adequately and result in minimum interference with performance of the Work and Owner's operations. Relocate and modify facilities as required.
2. Provide each facility ready for use when needed to avoid delay. Maintain and modify as required. Do not remove until facilities are no longer needed, or are replaced by authorized use of completed permanent facilities.

B. TEMPORARY UTILITIES

1. Temporary Telephones: Provide temporary telephone service for all personnel engaged in construction activities, throughout the construction period. Provide cellular telephone, operational and on site at all times.

C. TEMPORARY CONSTRUCTION AND SUPPORT FACILITIES INSTALLATION

1. Locate field offices, storage sheds, sanitary facilities and other temporary construction and support facilities for easy access and minimal interruption to Owner's operations.
 - a. Maintain temporary construction and support facilities until near Substantial Completion. Remove prior to Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to the Owner.
2. Field Offices: The Contractor, at his option, shall provide insulated, weather tight temporary offices of sufficient size to accommodate required office personnel at the Project site. Keep the office clean and orderly for use for small progress meetings. Furnish and equip offices as follows:
 - a. Furnish with a desk and chairs, a 4-drawer file cabinet, plan table and plan rack and a 6-shelf bookcase.
 - b. Equip with a water cooler and private toilet complete with water closet, lavatory and mirror-medicine cabinet unit.
3. Storage and Fabrication Sheds: Install storage and fabrication sheds, sized, furnished and equipped to accommodate materials and equipment involved,

including temporary utility service. Sheds may be open shelters or fully enclosed spaces within the building or elsewhere on the site.

4. Sanitary facilities include temporary toilets, wash facilities and drinking water fixtures. Comply with regulations and health codes for the type, number, location, operation and maintenance of fixtures and facilities. Install where facilities will best serve the Project's needs.
 - a. Provide toilet tissue, paper towels, paper cups and similar disposable materials for each facility. Provide covered waste containers for used material.
5. Toilets: Install self-contained toilet units. Shield toilets to ensure privacy. Use of pit-type privies will not be permitted.
6. Wash Facilities: Install wash facilities supplied with potable water at convenient locations for personnel involved in handling materials that require wash-up for a healthy and sanitary condition. Dispose of drainage properly. Supply cleaning compounds appropriate for each condition.
 - a. Provide safety showers, eye-wash fountains and similar facilities for convenience, safety and sanitation of personnel.
7. Drinking Water Facilities: Provide containerized tap-dispenser bottled-water type drinking water units, including paper supply.
 - a. Where power is accessible, provide electric water coolers to maintain dispensed water temperature at 45 to 55 deg F (7 to 13 deg C).
8. Collection and Disposal of Waste: Collect waste from construction areas and elsewhere daily. Comply with requirements of NFPA 241 for removal of combustible waste material and debris. Enforce requirements strictly. Do not hold materials more than 7 days during normal weather or 3 days when the temperature is expected to rise above 80 deg. F (27 deg C). Handle hazardous, dangerous, or unsanitary waste materials separately from other waste by containerizing properly. Dispose of material in a lawful manner. Do not use University trash containers for any reason.

D. SECURITY AND PROTECTION FACILITIES INSTALLATION

1. Site Enclosure Fence: Before construction operations begin, furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.
 - (a) Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.
2. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each work day.
3. Open-Mesh Fencing: Provide 11-gage, galvanized 2-inch, chain link fabric fencing 6-feet high with galvanized barbed wire top strand and galvanized steel

pipe posts, 1 1/2" I.D. for line posts and 2-1/2" I.D. for corner posts.

4. Barricades, Warning Signs and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
5. Do not remove temporary security and protection facilities until Substantial Completion, or longer as requested by the Architect.
6. Temporary Fire Protection: Install and maintain temporary fire protection facilities of the types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 10 "Standard for Portable Fire Extinguishers," and NFPA 241 "Standard for Safeguarding Construction, Alterations and Demolition Operations."
 - a. Locate fire extinguishers where convenient and effective for their intended purpose, but not less than one extinguisher on each floor at or near each usable stairwell.
 - b. Store combustible materials in containers in fire-safe locations.
 - c. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire protection facilities, stairways and other access routes for fighting fires. Prohibit smoking in hazardous fire exposure areas.
 - d. Provide supervision of welding operations, combustion type temporary heating units, and similar sources of fire ignition.
7. Environmental Protection: Provide protection, operate temporary facilities and conduct construction in ways and by methods that comply with environmental regulations, and minimize the possibility that air, waterways and subsoil might be contaminated or polluted, or that other undesirable effects might result. Avoid use of tools and equipment which produce harmful noise. Restrict use of noise making tools and equipment to hours that will minimize complaints from persons or firms near the site.

E. OPERATION, TERMINATION AND REMOVAL

1. Supervision: Enforce strict discipline in use of temporary facilities. Limit availability of temporary facilities to essential and intended uses to minimize waste and abuse.
2. Maintenance: Maintain facilities in good operating condition until removal. Protect from damage by freezing temperatures and similar elements.
3. Termination and Removal: Unless the Architect requests that it be maintained longer, remove each temporary facility when the need has ended, or when replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with the temporary facility. Repair damaged Work, clean exposed surfaces and replace construction that cannot be satisfactorily repaired.
 - a. Materials and facilities that constitute temporary facilities are property of the Contractor. The Owner reserves the right to take possession of Project identification signs.

END OF SECTION 015000

SECTION 01 60 00 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the contract, including General and Supplemental Conditions and Division 1 Specification Sections, apply to this section.

1.2 SECTION REQUIREMENTS

- A. Provide products of same kind from a single source. The term "product" includes the terms "material," "equipment," "system," and similar terms.
- B. Deliver, store, and handle products according to manufacturer's written instructions, using means and methods that will prevent damage, deterioration, and loss, including theft.
 - 1. Inspect products at time of delivery for compliance with the Contract Documents and to ensure items are undamaged and properly protected.
- C. Product Substitutions: Reasonable and timely requests for substitutions will be considered. Substitutions include products and methods of construction differing from that required by the Contract Documents and proposed by Contractor after award of Contract. Substitutions only allowed for products when more than one manufacturer is indicated.
 - 1. Submit two (2) copies of each request for product substitution. Identify product to be replaced and provide complete documentation showing compliance of proposed substitution with applicable requirements. Include a full comparison with the specified product, a list of changes to other Work required to accommodate the substitution, and any proposed changes in Contract Sum or Contract Time should the substitution be accepted.
 - 2. Submit requests for product substitution in time to permit processing of request and subsequent Submittals, if any, sufficiently in advance of when materials are required in the Work. Do not submit unapproved substitutions on Shop Drawings or other submittals.
 - 3. Owner will review the proposed substitution and notify Contractor of its acceptance or rejection.

PART 2 - PRODUCTS

2.1 PRODUCT OPTIONS

- A. Provide products that comply with the Contract Documents, are undamaged, and are new at the time of installation.
 - 1. Provide products complete with accessories, trim, finish, and other devices and components needed for a complete installation and the intended use and effect.

B. Select products as follows:

1. Where only a single product or manufacturer is named, provide the item indicated. No substitutions will be permitted.
2. Where two or more products or manufacturers are named, provide one of the items indicated. No substitutions will be permitted.
3. Where products or manufacturers are specified by name, accompanied by the term "or equal," provide the named item or comply with provisions concerning "product substitutions" to obtain approval for use of an unnamed product or manufacturer.
4. Where a product is described with required characteristics, with or without naming a brand or trademark, provide a product that complies with those characteristics and other Contract requirements.
5. Where compliance with performance requirements is specified, provide products that comply and are recommended in writing by the manufacturer for the application.
6. Where compliance with codes, regulations, or standards, is specified, select a product that complies with the codes, regulations, or standards referenced.

C. Unless otherwise indicated, Owner will select color, pattern, and texture of each product from manufacturer's full range of options.

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01 60 00

SECTION 173000 EXECUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

1. Drawings and general provisions of Contract, including General Conditions, Supplemental Conditions and other Division-1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:
 1. Construction layout.
 2. Installation of the Work.
 3. Cutting and patching.
 4. Coordination of Owner-installed products.
 5. Progress cleaning.
 6. Starting and adjusting.
 7. Protection of installed construction.
 8. Correction of the Work.
- B. Related Requirements:
 1. Section 011000 "Summary" for limits on use of Project site.

1.3 QUALITY ASSURANCE

- A. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
 1. Structural Elements: When cutting and patching structural elements, notify Consultant of locations and details of cutting and await directions from Consultant before proceeding. Shore, brace, and support structural element during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection
 2. 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 those results in increased maintenance or decreased operational life or safety.
 3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.
 4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Consultant's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Comply with requirements specified in other Sections.
 - 1. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Consultant for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
 - 1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
 - 2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
 - 3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
- B. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- B. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- C. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a written and email request for information to Consultant.

3.3 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings. If discrepancies are discovered, promptly notify Consultant by email and in writing.
 - 1. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
 - 2. Inform installers of lines and levels to which they must comply.
 - 3. Check the location, level and plumb, of every major element as the Work progresses.
 - 4. Notify Consultant when deviations from required lines and levels exceed allowable tolerances.
- B. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Consultant.

3.4 INSTALLATION

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
 - 1. Make vertical work plumb and make horizontal work level.
 - 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
 - 3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.
- F. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.
- G. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.

1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Consultant, and in compliance with accessibility requirements.
 2. Allow for building movement, including thermal expansion and contraction.
 3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- J. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.5 CUTTING AND PATCHING

- A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.
- C. Temporary Support: Provide temporary support of work to be cut.
- D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- E. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 3. Concrete: Cut using a cutting machine, such as an abrasive saw or a diamond- core drill.
 4. Proceed with patching after construction operations requiring cutting are complete.
- F. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.
1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.

2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
 3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 4. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.
- G. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.6 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
 2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.
 3. Containerize hazardous and unsanitary waste materials separately from other waste.
 4. Mark containers appropriately and dispose of legally, according to regulations.
- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
1. Remove liquid spills promptly.
 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways.
1. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- H. Clean and provide maintenance on completed construction as frequently as necessary through

the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

- I. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.7 STARTING AND ADJUSTING

- A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- B. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.
- C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.8 PROTECTION OF INSTALLED CONSTRUCTION

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- B. Comply with manufacturer's written instructions for temperature and relative humidity.

END OF SECTION 017300

**SECTION 017320
WASTE MANAGEMENT**

PART 1 - GENERAL

1.1 WASTE MANAGEMENT REQUIREMENTS

Owner requires that this project generate the least amount of trash and waste possible. Employ processes that ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors.

Minimize trash/waste disposal in landfills; reuse, salvage, or recycle as much waste as economically feasible.

Required Recycling, Salvage, and Reuse: The following may not be disposed of in landfills or by incineration and shall be recycled:

Aluminum and plastic beverage containers.

Corrugated cardboard.

Wood pallets.

Clean dimensional wood: May be used as blocking or furring.

Land clearing debris, including brush, branches, logs, and stumps.

Metals, including packaging banding, metal studs, sheet metal, structural steel, piping, reinforcing bars, door frames, and other items made of steel, iron, galvanized steel, stainless steel, aluminum, copper, zinc, lead, brass, and bronze.

Methods of trash/waste disposal that are **not** acceptable are:

Burning on the project site.

Burying on the project site.

Dumping or burying on other property, public or private.

Other illegal dumping or burying.

Regulatory Requirements: Contractor is responsible for knowing and complying with regulatory requirements, including but not limited to Federal, State and local requirements, pertaining to legal disposal of all construction and demolition waste materials.

1.2 DEFINITIONS

Clean: Untreated and unpainted; not contaminated with oils, solvents, caulk, or the like.

Construction and Demolition Waste: Solid wastes typically including building materials, packaging, trash, debris, and rubble resulting from construction, remodeling, repair and demolition operations.

Hazardous: Exhibiting the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity or reactivity.

Non-hazardous: Exhibiting none of the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity, or reactivity.

Nontoxic: Neither immediately poisonous to humans nor poisonous after a long period of exposure.

Recyclable: The ability of a product or material to be recovered at the end of its life cycle and remanufactured into a new product for reuse by others.

Recycle: To remove a waste material from the project site to another site for remanufacture into a new product for reuse by others.

Recycling: The process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for the purpose of using the altered form. Recycling does not include burning, incinerating, or thermally destroying waste.

Return: To give back reusable items or unused products to vendors for credit.

**SECTION 017320
WASTE MANAGEMENT**

Reuse: To reuse a construction waste material in some manner on the project site.

Salvage: To remove a waste material from the project site to another site for resale or reuse by others.

Sediment: Soil and other debris that has been eroded and transported by storm or well production run-off water.

Source Separation: The act of keeping different types of waste materials separate beginning from the first time they become waste.

Toxic: Poisonous to humans either immediately or after a long period of exposure.

Trash: Any product or material unable to be reused, returned, recycled, or salvaged.

Waste: Extra material or material that has reached the end of its useful life in its intended use. Waste includes salvageable, returnable, recyclable, and reusable material.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

1.3 WASTE MANAGEMENT PLAN IMPLEMENTATION

Manager: Designate an on-site person or persons responsible for instructing workers and overseeing and documenting results of the Waste Management Plan.

Communication: Distribute copies of the Waste Management Plan to job site foreman, each subcontractor, Owner, and the Architect.

Instruction: Provide on-site instruction of appropriate separation, handling, and recycling, salvage, reuse, and return methods to be used by all parties at the appropriate stages of the project.

Meetings: Discuss trash/waste management goals and issues at project meetings, including the Pre-bid meeting, Pre-construction meeting and regular job-site meetings.

Facilities: Provide specific facilities for separation and storage of materials for recycling, salvage, reuse, return, and trash disposal, for use by all contractors and installers.

As a minimum, provide:

Separate area for storage of materials to be reused on-site, such as wood cut-offs for blocking.

Separate dumpsters for each category of recyclable.

Recycling bins at worker lunch area.

Provide containers as required.

Provide adequate space for pick-up and delivery and convenience to subcontractors.

Keep recycling and trash/waste bin areas neat and clean and clearly marked in order to avoid contamination of materials.

Hazardous Wastes: Separate, store, and dispose of hazardous wastes according to applicable regulations.

Recycling: Separate, store, protect, and handle at the site identified recyclable waste products in order to prevent contamination of materials and to maximize recyclability of identified materials. Arrange for timely pickups from the site or deliveries to recycling facility in order to prevent contamination of recyclable materials.

Reuse of Materials On-Site: Set aside, sort, and protect separated products in preparation for reuse.

Salvage: Set aside, sort, and protect products to be salvaged for reuse off-site.

END OF SECTION 017320

**SECTION 017400
WARRANTIES AND BONDS**

1.1 GENERAL

A. RELATED DOCUMENTS

1. Drawings and general provisions of Contract, including General and Supplemental Conditions and other Division-1 Specification Sections, apply to this Section.

B. SUMMARY

1. This Section specifies general administrative and procedural requirements for warranties and bonds required by the Contract Documents, including manufacturers standard warranties on products and special warranties.
 - a. Refer to the General Conditions for terms of the Contractor's special warranty of workmanship and materials.
 - b. General closeout requirements are included in Section "Project Closeout."
 - c. Specific requirements for warranties for the Work and products and installations that are specified to be warranted, are included in the individual Sections of Divisions-2 through -16.
 - d. Certifications and other commitments and agreements for continuing services to Owner are specified elsewhere in the Contract Documents.
2. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products, nor does it relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.

C. DEFINITIONS

1. Standard Product Warranties are preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Owner.
2. Special Warranties are written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for the Owner.

D. WARRANTY REQUIREMENTS

1. Related Damages and Losses: When correcting warranted Work that has failed, remove and replace other Work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted Work.
2. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.
3. Replacement Cost: Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with

requirements of Contract Documents. The Contractor is responsible for the cost of replacing or rebuilding defective Work regardless of whether the Owner has benefitted from use of the Work through a portion of its anticipated useful service life.

4. Owner's Recourse: Written warranties made to the Owner are in addition to implied warranties, and shall not limit the duties, obligations, rights and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitations on time in which the Owner can enforce such other duties, obligations, rights, or remedies.
 - a. Rejection of Warranties: The Owner reserves the right to reject warranties and to limit selections to products with warranties not in conflict with requirements of the Contract Documents.
5. The Owner reserves the right to refuse to accept Work for the Project where a special warranty, certification, or similar commitment is required on such Work or part of the Work, until evidence is presented that entities required to countersign such commitments are willing to do so.

E. SUBMITTALS

1. Submit written warranties to the Architect prior to the date certified for Substantial Completion. If the Architect's Certificate of Substantial Completion designates a commencement date for warranties other than the date of Substantial Completion for the Work, or a designated portion of the Work, submit written warranties upon request of the Architect.
 - a. When a designated portion of the Work is completed and occupied or used by the Owner, by separate agreement with the Contractor during the construction period, submit properly executed warranties to the Architect within fifteen days of completion of that designated portion of the Work.
2. When a special warranty is required to be executed by the Contractor, or the Contractor and a subcontractor, supplier or manufacturer, prepare a written document that contains appropriate items and identification, ready for execution by the required parties. Submit a draft to the Owner through the Architect for approval prior to final execution.
 - a. Refer to individual Sections of Divisions-2 through -16 for specific content requirements, and particular requirements for submittal of special warranties.
3. Forms of Submittal: At Final Completion compile two copies of each required warranty and bond properly executed by the Contractor, or by the Contractor, subcontractor, supplier, or manufacturer. Organize the warranty documents into an orderly sequence based on the table of contents of the Project Manual.
1. Bind warranties and bonds in heavy-duty, commercial quality, durable 3-ring vinyl covered loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2" by 11" paper.
 - a. Provide heavy paper dividers with celluloid covered tabs for each separate warranty. Mark the tab to identify the product or installation. Provide a

typed description of the product or installation, including the name or the product, and the name, address and telephone number of the installer.

- b. Identify each binder on the front and the spine with the typed or printed title "WARRANTIES AND BONDS, the Project title or name, and the name of the Contractor.

2. When operating and maintenance manuals are required for warranted construction, provide additional copies of each required warranty, as necessary, for inclusion in each required manual.

1.2 PRODUCTS (NOT APPLICABLE)

1.3 EXECUTION

A. SCHEDULE OF WARRANTIES

1. Schedule: Provide warranties and bonds on products and installations as specified in the appropriate Sections.

END OF SECTION 017400

**SECTION 017700
PROJECT CLOSEOUT**

1.1 GENERAL

A. RELATED DOCUMENTS

1. Drawings and general provisions of Contract, including General and Supplemental Conditions and other Division-1 Specification Sections, apply to this Section.

B. SUMMARY

1. This Section specifies administrative and procedural requirements for project closeout, including but not limited to:
 - a. Inspection procedures
 - b. Project record document submittal
 - c. Operating and maintenance manual submittal
 - d. Submittal of warranties
 - e. Final cleaning
 - f. Closeout requirements for specific construction activities are included in the appropriate Sections in Divisions - 2 through - 33.

C. SUBSTANTIAL COMPLETION

1. Preliminary Procedures: Before requesting inspection for certification of Substantial Completion, complete the following. List exceptions in the request.
 - a. In the Application for Payment that coincides with, or first follows, the date Substantial Completion is claimed, show 100 percent completion for the portion of the Work claimed as substantially complete. Include supporting documentation for completion as indicated in these Contract Documents and a statement showing an accounting of changes to the Contract Sum.
 - 1) If 100 percent completion cannot be shown, include a list of incomplete items, the value of incomplete construction, and reasons the Work is not complete.
 - b. Advise Owner of pending insurance change-over requirements.
 - c. Submit specific warranties, workmanship bonds, maintenance agreements, final certifications and similar documents.
 - d. Obtain and submit releases enabling the Owner unrestricted use of the Work and access to services and utilities; include occupancy permits, operating certificates and similar releases.
 - e. See the *Supplemental Conditions of the Contract for Construction* 3.11 for Documentation and As-Built Conditions, and the *Project Closeout Checklist: Contractor Requirements*. Submit maintenance manuals, final project photographs, damage or settlement survey, property survey, and similar final record information.
 - f. Deliver tools, spare parts, extra stock, and similar items.
 - h. Complete start-up testing of systems, and instruction of the Owner's operating and maintenance personnel. Discontinue or change over and remove temporary facilities from the site, along with construction tools, mock-ups, and similar elements.
 - i. Complete final clean up requirements, including touch-up painting. Touch-up and otherwise repair and restore marred exposed finishes.

2. Inspection Procedures: On receipt of a request for inspection, the Consultant will either proceed with inspection or advise the Contractor of unfilled requirements. The Consultant will prepare the Certificate of Substantial Completion following inspection, or advise the Contractor of construction that must be completed or corrected before the certificate will be issued.
 - a. The Consultant will repeat inspection when requested and assured that the Work has been substantially completed.
 - b. Results of the completed inspection will form the basis of requirements for final inspection.

D. FINAL ACCEPTANCE

1. Preliminary Procedures: Before requesting final inspection for certification of final acceptance and final payment, complete the following. List exceptions in the request.
 - a. Submit the final payment request with releases and supporting documentation not previously submitted and accepted. Include certificates of insurance for products and completed operations where required.
 - b. Submit an updated final statement, accounting for final additional changes to the Contract Sum.
 - c. Submit a certified copy of the Consultant's final inspection list of items to be completed or corrected, stating that each item has been completed or otherwise resolved for acceptance, and the list has been endorsed and dated by the Consultant.
 - e. Submit consent of surety to final payment.
 - f. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
2. Re-inspection Procedure: The Consultant will re-inspect the Work upon receipt of notice that the Work, including inspection list items from earlier inspections, has been completed, except items whose completion has been delayed because of circumstances acceptable to the Consultant.
 - a. Upon completion of re-inspection, the Consultant will prepare a certificate of final acceptance, or advise the Contractor of Work that is incomplete or of obligations that have not been fulfilled but are required for final acceptance.
 - b. If necessary, re-inspection will be repeated.

E. RECORD DOCUMENT SUBMITTALS

1. **See also the *Supplemental Conditions of the Contract for Construction 3.11 for Documentation and As-Built Conditions, and the Project Closeout Checklist: Contractor Requirements.***
2. General: Do not use record documents (red-line markups) for construction purposes; protect from deterioration and loss in a secure, fire-resistive location; provide access to record documents for the Consultant's reference during normal working hours.
3. Record Drawings (Red-lined): Maintain two clean, undamaged sets of blue or black line white-prints of Contract Drawings and Shop Drawings. Mark the sets to show the red-line changes during the course of construction with actual installation where the installation varies substantially from the Work as originally shown. Mark whichever drawing is most capable of showing conditions fully and accurately; where Shop Drawings are used, record a cross-reference at the

corresponding location on the Contract Drawings. Give particular attention to concealed elements that would be difficult to measure and record at a later date.

- a. Mark record sets with red erasable pencil; use other colors to distinguish between variations in separate categories of the Work.
 - b. Mark new information that is important to the Owner, but was not shown on Contract Drawings or Shop Drawings.
 - c. Note related Change Order numbers where applicable.
 - d. Organize record drawing sheets into manageable sets, bind with durable paper cover sheets, and print suitable titles, dates and other identification on the cover of each set.
4. Record Specifications: Maintain one complete copy of the Project Manual, including addenda, and one copy of other written construction documents such as Change Orders and modifications issued in printed form during construction. Mark these documents to show substantial variations in actual Work performed in comparison with the text of the Specifications and modifications. Give particular attention to substitutions, selection of options and similar information on elements that are concealed or cannot otherwise be readily discerned later by direct observation. Note related record drawing information and Product Data.
- a. Upon completion of the Work, submit record Specifications to the Consultant for the Owner's records.
5. Record Product Data: Maintain one copy of each Product Data submittal. Mark these documents to show significant variations in actual Work performed in comparison with information submitted. Include variations in products delivered to the site, and from the manufacturer's installation instructions and recommendations. Give particular attention to concealed products and portions of the Work which cannot otherwise be readily discerned later by direct observation. Note related Change Orders and mark up of record drawings and Specifications.
- a. Upon completion of mark-up, submit (3) complete sets of record Product Data to the Consultant for the Owner's records.
6. Record Sample Submitted: Immediately prior to the date or dates of Substantial Completion, the Contractor will meet at the site with the Consultant and the Owner's personnel to determine which of the submitted Samples that have been maintained during progress of the Work are to be transmitted to the Owner for record purposes. Comply with delivery to the Owner's Sample storage area
7. Miscellaneous Record Submittals: Refer to other Specification Sections for requirements of miscellaneous record-keeping and submittals in connection with actual performance of the Work. Immediately prior to the date or dates of Substantial Completion, complete miscellaneous records and place in good order, properly identified and bound or filed, ready for continued use and reference. Submit to the Consultant for the Owner's records.
8. Maintenance Manuals: Provide one (1) draft copy for review. Provide **one (1)** final paper copy and one electronic pdf file prior to final completion. Organize operating and maintenance data into suitable sets of manageable size. Bind properly indexed data in individual heavy-duty 3-inch, 3 ring vinyl-covered binders. Mark appropriate identification on front and spine of each binder. Include the following types of information; and others as specified in other Divisions:
- a. Emergency instructions
 - b. Spare parts list
 - c. Copies of warranties
 - d. Wiring diagrams

- e. Recommended "turn around" cycles
- f. Inspection procedures
- g. Shop Drawings and Product Data
- h. Fixture lamping schedule
- i. List of final color and material selections

F. WARRANTIES AND BONDS

1. SUMMARY

- a. This Section specifies general administrative and procedural requirements for warranties and bonds required by the Contract Documents, including manufacturer's standard warranties on products and special warranties.
 - 1) Refer to the General Conditions and Supplemental Conditions for terms of the Contractor's special warranty of workmanship and materials.
 - 2) General closeout requirements are included in Section "Project Closeout."
 - 3) Specific requirements for warranties for the Work and products and installations that are specified to be warranted, are included in the individual Sections of Divisions-2 through -16.
 - 4) Certifications and other commitments and agreements for continuing services to Owner are specified elsewhere in the Contract Documents.
- B. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products, nor does it relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.
- C. Separate Prime Contracts: Each prime Contractor is responsible for warranties related to its own Contract.

2. DEFINITIONS

- a. Standard Product Warranties are preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Owner.
- b. Special Warranties are written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for the Owner.

3. WARRANTY REQUIREMENTS

- a. Related Damages and Losses: When correcting warranted Work that has failed, remove and replace other Work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted Work.
- b. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.
- c. Replacement Cost: Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of Contract Documents. The Contractor is

responsible for the cost of replacing or rebuilding defective Work regardless of whether the Owner has benefitted from use of the Work through a portion of its anticipated useful service life.

- d. Owner's Recourse: Written warranties made to the Owner are in addition to implied warranties, and shall not limit the duties, obligations, rights and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitations on time in which the Owner can enforce such other duties, obligations, rights, or remedies.
 - 1) Rejection of Warranties: The Owner reserves the right to reject warranties and to limit selections to products with warranties not in conflict with requirements of the Contract Documents.
- e. The Owner reserves the right to refuse to accept Work for the Project where a special warranty, certification, or similar commitment is required on such Work or part of the Work, until evidence is presented that entities required to countersign such commitments are willing to do so.

4. SUBMITTALS

- a. Submit written warranties to the Consultant prior to the date certified for Substantial Completion. If the Consultant's Certificate of Substantial Completion designates a commencement date for warranties other than the date of Substantial Completion for the Work, or a designated portion of the Work, submit written warranties upon request of the Consultant.
 - 1) When a designated portion of the Work is completed and occupied or used by the Owner, by separate agreement with the Contractor during the construction period, submit properly executed warranties to the Consultant within fifteen days of completion of that designated portion of the Work.
- b. Forms of Submittal: At Final Completion compile two copies of each required warranty and bond properly executed by the Contractor, or by the Contractor, subcontractor, supplier, or manufacturer. Organize the warranty documents into an orderly sequence based on the table of contents of the Project Manual.
- c. Bind warranties and bonds in heavy-duty, commercial quality, durable 3-ring vinyl covered loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2" by 11" paper.
 - 1) Provide heavy paper dividers with celluloid covered tabs for each separate warranty. Mark the tab to identify the product or installation. Provide a typed description of the product or installation, including the name or the product, and the name, address and telephone number of the installer.
 - 2) Identify each binder on the front and the spine with the typed or printed title "WARRANTIES AND BONDS, the Project title or name, and the name of the Contractor.
- e. When operating and maintenance manuals are required for warranted construction, provide additional copies of each required warranty, as necessary, for inclusion in each required manual.

1.2 EXECUTION

A. CLOSEOUT PROCEDURES

1. Functional Demonstration: Demonstrate proper operation of all systems to Consultants and Owners representative prior to request for substantial completion. Coordinate schedule with Consultant.
2. Operating and Maintenance Instructions: Provide two (2) duplicate training sessions for each MSU trade group responsible for systems installed under this project. Coordinate schedule with Owner. Arrange for each installer of equipment that requires regular maintenance to meet with the Owner's personnel to provide instruction in proper operation and maintenance. If installers are not experienced in procedures, provide instruction by manufacturer's representatives. Include a detailed review of the following items:
 - a. Maintenance manuals
 - b. Record documents
 - c. Spare parts and materials
 - d. Tools
 - e. Lubricants
 - f. Fuels
 - g. Identification systems
 - h. Control sequences
 - i. Hazards
 - j. Cleaning
 - k. Warranties and bonds
 - 1) Maintenance agreements and similar continuing commitments

END OF SECTION 017700

**SECTION 017823
OPERATION AND MAINTENANCE DATA**

PART 1 - GENERAL

1.1 A.RELATED DOCUMENTS

- A. General provisions of Contract, including General and Supplemental Conditions and other Division-1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:

- 1. Operation and maintenance documentation directory.
- 2. Operation manuals for systems, subsystems, and equipment.
- 3. Product maintenance manuals.
- 4. Systems and equipment maintenance manuals.

1.3 CLOSEOUT SUBMITTALS

- A. Manual Content: Operations and maintenance manual content is specified in individual Specification Sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.

- 1. Architect will comment on whether content of operations and maintenance submittals are acceptable.
- 2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.

- B. Format: Submit operations and maintenance manuals in the following format:

- 1. PDF electronic file. Assemble each manual into a composite electronically indexed file. Submit on digital media acceptable to Architect.
 - a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory.
 - b. Enable inserted reviewer comments on draft submittals.
- 2. One paper copy and one electronic pdf. Include a complete operation and maintenance directory. Enclose title pages and directories in clear plastic sleeves. Architect will deliver copies to the Owner.

- C. Manual Submittal: Submit each manual in DRAFT in PDF format form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. Architect and Commissioning Authority will return copy with comments.
PROVIDE PAPER AND PDF OF FINAL APPROVED MANUALS

1. Correct or revise each manual to comply with Architect's and Commissioning Authority's comments. Submit copies of each corrected manual within 15 days of receipt of Architect's and Commissioning Authority's comments and prior to commencing demonstration and training.

PART 2 - PRODUCTS

2.1 REQUIREMENTS FOR OPERATION, AND MAINTENANCE MANUALS

- A. Directory: Prepare a single, comprehensive directory of emergency, operation, and maintenance data and materials, listing items and their location to facilitate ready access to desired information.
- B. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
 1. Title page.
 2. Table of contents.
 3. Manual contents.
- C. Title Page: Include the following information:
 1. Subject matter included in manual.
 2. Name and address of Project.
 3. Name and address of Owner.
 4. Date of submittal.
 5. Name and contact information for Contractor.
 6. Name and contact information for Construction Manager.
 7. Name and contact information for Architect.
 8. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
 9. Cross-reference to related systems in other operation and maintenance manuals.
- D. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
- E. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.
- F. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.
 1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
 2. File Names and Bookmarks: Enable bookmarking of individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily

navigated file tree. Configure electronic manual to display bookmark panel on opening file.

- G. Manuals, Paper Copy: Submit manuals in the form of hard copy, bound and labeled volumes.
1. Binders: These binders are sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and oversize sheets will need to be folded to 8x11.5.
 - a. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents, and indicate Specification Section number on bottom of spine. Indicate volume number for multiple-volume sets.
 2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
 3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment.
 4. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
 - a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
 - b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.2 OPERATION MANUALS

- A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
 2. Performance and design criteria if Contractor is delegated design responsibility.
 3. Operating standards.
 4. Operating procedures.
 5. Operating logs.
 6. Wiring diagrams.
 7. Control diagrams.
 8. Precautions against improper use.
 9. License requirements including inspection and renewal dates.
- B. Descriptions: Include the following:
1. Product name and model number. Use designations for products indicated on Contract Documents.
 2. Manufacturer's name.
 3. Equipment identification with serial number of each component.
 4. Equipment function.
 5. Operating characteristics.
 6. Limiting conditions.

7. Performance curves.
 8. Engineering data and tests.
 9. Complete nomenclature and number of replacement parts.
- C. Operating Procedures: Include the following, as applicable:
1. Startup procedures.
 2. Equipment or system break-in procedures.
 3. Routine and normal operating instructions.
 4. Regulation and control procedures.
 5. Instructions on stopping.
 6. Normal shutdown instructions.
 7. Seasonal and weekend operating instructions.
 8. Required sequences for electric or electronic systems.
 9. Special operating instructions and procedures.
- D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.
- E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

2.3 PRODUCT MAINTENANCE MANUALS

- A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.
- B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.
- C. Product Information: Include the following, as applicable:
1. Product name and model number.
 2. Manufacturer's name.
 3. Color, pattern, and texture.
 4. Material and chemical composition.
 5. Reordering information for specially manufactured products.
- D. Maintenance Procedures: Include manufacturer's written recommendations and the following:
1. Inspection procedures.
 2. Types of cleaning agents to be used and methods of cleaning.
 3. List of cleaning agents and methods of cleaning detrimental to product.
 4. Schedule for routine cleaning and maintenance.
 5. Repair instructions.
- E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.
- F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

2.4 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

- A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.
- B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.
- C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:
 - 1. Standard maintenance instructions and bulletins.
 - 2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
 - 3. Identification and nomenclature of parts and components.
 - 4. List of items recommended to be stocked as spare parts.
- D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
 - 1. Test and inspection instructions.
 - 2. Troubleshooting guide.
 - 3. Precautions against improper maintenance.
 - 4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 - 5. Aligning, adjusting, and checking instructions.
 - 6. Demonstration and training video recording, if available.
- E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
- F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.
- G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.
- H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

- A. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

- B. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.
- C. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
- D. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.
 - 1. Do not use original project record documents as part of operation and maintenance manuals.
- E. Comply with Division 01 Section "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

PART 4 - MATERIAL AND FINISHES MAINTENANCE MANUAL

- A. General: Incorporate as part of the O & M Manuals. Material and finishes to the Architect/Engineer for approval and distribution. Provide one section for architectural products, including applied materials and finishes, and a second section for products designed for moisture protection and products exposed to the water.
 - 1. Refer to individual specification sections for additional requirements on the care and maintenance of materials and finishes
- B. Architectural Products, Applied Materials and Finishes: Provide complete manufacturers data and instructions on the care and maintenance of architectural products, including applied materials and finishes.
- C. Manufacturers Data: Provide complete information on architectural products, including but not limited to the following items, as applicable:
 - 1. Manufacturer's catalog number
 - 2. Size
 - 3. Material composition
 - 4. Color texture reordering information for specially manufactured products
 - 5. Manufacturer and supplier/installers contact information
 - 6. Warranty terms
- D. Care and Maintenance Instruction: Provide complete information on the care and maintenance of architectural products, including the manufacturer's recommendations for the types of cleaning agents to be used and the methods of cleaning. In addition, provide information regarding cleaning agents and methods which could prove detrimental to the product. Include the manufacturer's recommended schedule for cleaning and maintenance.

- E. **Manufacturer's Data:** Provide complete manufacturer's data giving detailed information including, but not limited to the following, as applicable:
1. Applicable standards
 2. Chemical composition
 3. Installation details
 4. Inspection procedures
 5. Maintenance information
 6. Repair procedures
- F. **Schedule:** Provide complete information in the materials and finishes manual on products specified in the following sections: (To be determined with Owner)
- G. **Color Schedule:** Provide complete information on MSU CPDC provided electronic spreadsheet form, to include manufacturer's name and number, location, item and surface of all painted, stained or treated material, surface or piece of equipment.

END OF SECTION 017823

SECTION 017839
PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. See also General Conditions and Supplemental Conditions of the Contract for Construction.
- B. **See the *Supplemental Conditions of the Contract for Construction 3.11 for Documentation and As-Built Conditions, and the Project Closeout Checklist: Contractor Requirements***
- C. Section includes administrative and procedural requirements for project record documents, including the following:
 - 1. Record Drawings.
 - 2. Record Specifications.
 - 3. Record Product Data.
- D. Related Requirements:
 - 1. Division 01 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
 - 2. Divisions 02 through 33 Sections for specific requirements for project record documents of the Work in those Sections.

1.2 CLOSEOUT SUBMITTALS

- A. Record Drawings (Redline Markups): Comply with the following:
 - 1. Number of Copies: Submit copies of record Drawings as follows:
 - a. Draft Submittal:
 - 1) Submit PDF electronic files of scanned record prints.
 - 2) Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.
 - b. Final Submittal:
 - 1) Submit one paper-copy set(s) of marked-up record prints.
 - 2) Submit PDF electronic files of scanned record prints and one set(s) of prints.
 - 3) Print each drawing, whether or not changes and additional information were recorded.
- B. Record Specifications: Submit one annotated PDF electronic files of Project's Specifications, including addenda and contract modifications.
- C. Record Product Data: Submit one annotated PDF electronic files and directories of each submittal.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

- A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised Drawings as modifications are issued.
1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.
 - a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
 - b. Record data as soon as possible after obtaining it.
 - c. Record and check the markup before enclosing concealed installations.
 2. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
 3. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
 4. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
- B. Format: Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
1. Record Prints: Organize record prints and newly prepared record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
 2. Format: Annotated PDF electronic file with comment function enabled.
 3. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
 4. Identification: As follows:
 - a. Project name and PPA Number.
 - b. Date.
 - c. Designation "PROJECT RECORD DRAWINGS."
 - d. Name of Architect.
 - e. Name of Contractor.

2.2 RECORD SPECIFICATIONS

- A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.
1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
 3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.

4. Note related Change Orders, record Product Data, and record Drawings where applicable.
- B. Format: Submit record Specifications as annotated PDF electronic file

2.3 RECORD PRODUCT DATA

- A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
 3. Note related Change Orders, record Specifications, and record Drawings where applicable.
- B. Format: Submit record Product Data as annotated PDF electronic file.

2.4 MISCELLANEOUS RECORD SUBMITTALS

- A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.
- B. Format: Submit miscellaneous record submittals as PDF electronic file.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

- A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.
- B. Maintenance of Record Documents and Samples: Store record documents and Samples in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Architect's reference during normal working hours.

END OF SECTION 017839

**SECTION 017900
DEMONSTRATION AND TRAINING**

PART 1 - GENERAL

1.1 SUMMARY

1. System Demonstration:

- a. **General:**
 - i. The system demonstration is a functional test of systems to determine whether they are substantially complete and operating as specified. Systems are to be tested and confirmed to be operating properly by the contractor prior to the Demonstration.
 - ii. Where initial Demonstration Session uncovers substantial deficiencies that require more than one Demonstration Session, Contractor shall reimburse Owner for personnel costs associated with performing subsequent Sessions.
- b. **Systems to be Tested:**
 - i. All systems installed and/or provided under the project to have functional testing.
- c. **Attendance:**
 - i. The system demonstration is to be provided by trained representatives that are familiar with the systems, and can operate systems as required to test and verify proper function. The Engineer and Owner's representatives will be present to document performance and/or deficiencies. The General Contractor or others may attend if desired.
 - ii. Individual testing sessions (modules) shall be provided for each type or group of systems, separated roughly by trade group that will be performing maintenance on the system. MSU trades groups and systems typically involved in testing are:
 - (1) Electricians
 - (2) Heating Plant (Hydronic and steam heating systems, controls)
 - (3) Plumbers (Plumbing, gas-fired heating, process piping systems)
 - (4) Refrigeration (Refrigeration, chilled water, packaged cooling systems)
- d. **Schedule:**
 - i. Contractor to coordinate time requirements and dates with Owner and Engineer. Begin scheduling with sufficient time prior to desired Substantial Completion date to allow all parties to work into schedule, and for deficiencies to be completed prior to desired Substantial Completion date. Demonstration is to be provided prior to, and separate from, training.

2. Training:

- a. **General:**
 - i. The system training is intended to familiarize the Owner's operating and maintenance staff with all systems requiring maintenance. Training is to be provided after the systems are in place and operational, after issues noted during the Demonstration have been resolved, and before final acceptance.
- b. **Systems Requiring Training:**
 - i. All systems installed and/or provided under the project are to have training.
- c. **Attendance:**
 - i. Training is to be provided by trained representatives that are familiar with the system's operation and maintenance requirements. Individual training sessions (modules) shall be provided for each type or group of systems, separated roughly by trade group that will be performing maintenance on the system. MSU trades groups and systems typically requiring training are:
 - (1) Electricians

- (2) Heating Plant (Hydronic and steam heating systems, controls)
 - (3) Plumbers (Plumbing, gas-fired heating, process piping systems)
 - (4) Refrigeration (Refrigeration, chilled water, packaged cooling systems)
- d. Schedule:
- i. Duplicate training sessions are to be provided for each training module, so that Owner's operating personnel can be split into two groups during training. Duplicate training sessions to be scheduled during different weeks. Length of training sessions will be determined by scope of training, and as coordinated with Owner after draft copy of training documents have been reviewed.
- 2.1 PRODUCTS
- 1. Not applicable
- 3.1 EXECUTION
- 1. Demonstration:
 - a. Demonstration Program:
 - i. Engineer to develop a demonstration program to verify the proper operation of all required systems. Submit program to Owner and Contractor at least two weeks prior to Demonstration.
 - ii. Engineer to work with Contractor to generate methods to be used to verify sequences and modes of operation that cannot be verified directly.
 - iii. Engineer to provide at least one copy of all submittals, contract drawings, specifications, and changes related to systems to be demonstrated. Documents to be made available during Demonstration.
 - iv. Contractor to provide at least one copy of Operating and Maintenance Manuals to be used during demonstration, including specified sequences of operation for field-constructed systems, and operating sequences for all manufactured equipment.
 - b. Demonstration Session:
 - i. Verify that all systems are functional and ready to operate in all modes prior to demonstration.
 - ii. Assemble all program materials required for demonstration.
 - iii. Contractor to provide all equipment necessary for access to, and operation of, systems including tools, ladder, lighting, and diagnostic equipment.
 - iv. Verify operation of individual components within systems.
 - v. Verify controls of related components are coordinated.
 - vi. Verify all operating sequences, operating modes, and safety controls.
 - vii. Record all pressures, temperatures, and other relevant data available from installed devices.
 - viii. Where digital control systems are available, set-up trend reports of relevant parameters which will confirm proper operation of systems installed, modified, or affected by changes made during this project. Provide copies of reports to Engineer and Owner for review. Review, analyze, and discuss results, and provide follow-up reports as required to confirm proper operation.
 - 2. Training:
 - a. Training Documentation:
 - i. Contractor to submit draft copy of agenda and training documents to Owner for review at least two weeks prior to training date.
 - ii. Provide a copy of the following items for each person that will be attending the

training sessions. Coordinate required number with the Owner.

- (1) Training agenda.
- (2) Summary of new systems and existing systems affected by this project.
- (3) Summary of work performed under this project.
- (4) Control system drawings and sequences of operation.
- (5) List of important maintenance and trouble-shooting operations for all systems.

iii. Provide minimum of 2 copies of following items:

- (1) Contract documents including all drawings, specifications, addendums, and change orders.

b. Training Sessions:

- i. Assemble at location to be determined by the Owner.
- ii. Distribute training documentation as indicated above.
- iii. Provide classroom style training if required for orientation, discussion of new systems and existing systems affected by this project, and other issues appropriate for a classroom format.
- iv. Visit site and review locations, and perform detailed review of operation and maintenance requirements for current systems.

END OF SECTION 179000

**SECTION 024119
SELECTIVE DEMOLITION**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General Conditions and Supplemental Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Demolition and removal of selected portions of building or structure.
 - 2. Salvage of existing items to be reused or recycled.

1.3 DEFINITIONS

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

1.4 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Standards: Comply with ANSI A10.6 and NFPA 241.

1.5 PRE-INSTALLATION MEETINGS

- A. Pre-demolition Conference: Conduct conference at Project site.

1.6 CLOSEOUT SUBMITTALS

- A. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

1.7 FIELD CONDITIONS

- A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.
- B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
 - 1. Before selective demolition, Owner will remove the following items:
 - a. Text books and other loose classroom resources.
 - b. Loose shelving units and storage cabinets.
 - c. Loose furniture (tables and chairs).
 - d. Loose equipment.

- C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

D. Hazardous Materials: Hazardous materials are present in buildings and structures to be selectively demolished. A report on the presence of hazardous materials is included in the Contract Documents. Examine report to become aware of locations where hazardous materials are present. Do not proceed with selective demolition until all hazardous materials have been removed. Do not proceed with selective demo until all hazardous materials have been removed.

1. Hazardous material remediation is specified elsewhere in the Contract Documents.
2. Do not disturb hazardous materials or items suspected of containing hazardous materials
 - i. except under procedures specified elsewhere in the Contract Documents.

E. Storage or sale of removed items or materials on-site is not permitted.

F. Utility Service: Maintain existing utilities and the protection facilities indicated to remain in service and protect them against damage during selective demolition operations.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Standards: Comply with ANSI/ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped before starting selective demolition operations.

B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.

C. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit and email a written report to Architect and MSU Project Manager.

3.2 UTILITY SERVICES AND MECHANICAL/ ELECTRICAL SYSTEMS

A. Existing Services/ Systems to Remain: Maintain services/ systems indicated to remain and protect them against damage.

B. Comply with requirements for existing services/ systems interruptions specified in Section 011000 "Summary."

C. Existing Services/ Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/ electrical systems serving areas to be selectively demolished.

1. If services/ systems are required to be removed, relocated, or abandoned, provide temporary

services/ systems that bypass area of selective demolition and that maintain continuity of services/ systems to other parts of building.

2. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated to be removed.
3. Piping to be removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
4. Piping to be abandoned in place: Drain piping and cap or plug piping with same or compatible piping material.
5. Equipment to be removed: Disconnect and cap services and remove equipment.
6. Equipment to be removed and reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
7. Equipment to be removed and salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
8. Ducts to be removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
9. Ducts to be abandoned in place: Cap or plug ducts with same or compatible ductwork material.

3.3 PREPARATION

A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Comply with requirements for access and protection specified in Section 015000 "Temporary Facilities and Controls".

B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

3.4 SELECTIVE DEMOLITION, GENERAL

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

B. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.

C. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.

D. Do not use cutting torches for selective demolition operations.

E. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.

F. Dispose of demolished items and materials promptly.

G. Removed and Salvaged Items:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area on campus as directed by Owner.
5. Protect items from damage during transport and storage.

H. Removed and Reinstalled Items:

1. Clean and repair items to functional condition adequate for intended reuse.
 2. Pack or crate items after cleaning and repairing. Identify contents of containers.
 3. Protect items from damage during transport and storage.
 4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.
- I. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.5 DISPOSAL OF DEMOLISHED MATERIALS

- A. General: Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them.
1. Do not allow demolished materials to accumulate on-site.
 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
 3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
 4. Comply with requirements specified in Section 017419 "Construction Waste Management and Disposal".
- B. Burning: Do not burn demolished materials.

3.6 CLEANING

- A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION 024119

SECTION 05 58 00 - FORMED METAL FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Stainless steel trim panels.

1.2 SUBMITTALS

- A. General: Submit in accordance with Section 01330.
- B. Product Data: Submit product data for stainless steel countertops and shelving.
- C. Shop Drawings:
 - 1. Submit shop drawings for stainless steel closure panels.
 - 2. Clearly show roughing-in dimensions, fabrication details, and attachments to other work.

1.3 QUALITY ASSURANCE

- A. Single Source Responsibility: Provide stainless steel fabrications from one manufacturer.
- B. Manufacturer Qualifications: Company specializing in manufacturing Products specified in this Section with minimum 5 years documented experience.
- C. NSF Standards: Comply with applicable NSF International (NSF) standards and criteria and provide NSF Certification Mark on each stainless steel shelving and countertop item, unless otherwise indicated.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Stainless-Steel Sheet, Strip, Plate, and Flat Bar: ASTM A666, Type 304, stretcher leveled, and in finish specified in "Stainless-Steel Finishes" Article.
- B. Stainless-Steel Tube: ASTM A554, Grade MT-304, and in finish specified in "Stainless-Steel Finishes" Article.
- C. Sealant:
 - 1. ASTM C920; Type S, Grade NS, Class 25, Use NT. Provide elastomeric sealant NSF certified for end-use application indicated.
 - 2. Color: As selected by Architect from manufacturer's full range of colors.
 - 3. Backer Rod: Closed-cell polyethylene, in diameter larger than joint width.

2.2 FABRICATION

- A. Fabricate stainless steel according to NSF 2 requirements. Factory assemble items to greatest extent possible.
- B. Welding: Use welding rod of same composition as metal being welded. Use methods that minimize distortion and develop strength and corrosion resistance of base metal. Provide ductile welds free of mechanical imperfections such as gas holes, pits, or cracks.
 - 1. Welded Butt Joints: Provide full-penetration welds for full-joint length. Make joints flat, continuous, and homogenous with sheet metal without relying on straps under seams, filling in with solder, or spot welding.
 - 2. Grind exposed welded joints flush with adjoining material and polish to match adjoining surfaces.
 - 3. Where fasteners are welded to underside of equipment, finish reverse side of weld smooth and undepressed.
 - 4. Coat unexposed stainless-steel welded joints with suitable metallic-based paint to prevent corrosion.
- C. Where stainless steel is joined to a dissimilar metal, use stainless-steel welding material or fastening devices.
- D. Form metal with break bends that are not flaky, scaly, or cracked in appearance; where breaks mar uniform surface appearance of material, remove marks by grinding, polishing, and finishing.

- E. Sheared Metal Edges: Finish free of burrs, fins, and irregular projections.
- F. Cap exposed fastener threads, including those inside cabinets, with stainless-steel lock washers and stainless-steel cap (acorn) nuts.
- G. Edges and Backsplashes: Provide equipment edges and backsplashes indicated complying with SMACNA standards, unless otherwise indicated.

2.3 FINISHES

- A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations relative to applying and designating finishes.
 - 1. Remove or blend tool and die marks and stretch lines into finish.
 - 2. Grind and polish surfaces to produce uniform, directional textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.
- B. Concealed Surfaces: No. 2B finish (bright, cold-rolled, unpolished finish).
- C. Exposed Surfaces: No. 4 finish (bright, directional polish).
- D. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
- E. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipment.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine stainless steel thoroughly upon removal from packing crates and protective wrappings upon arrival at site.
- B. Verify that accessories necessary for complete installation have been included.
- C. Examine installation area to ensure rough-in requirements have been met and area is ready to receive stainless steel countertops.

3.2 PREPARATION

- A. Verify that clearances at final location are adequate for proper functioning and operation of unit.

3.3 INSTALLATION

- A. Anchor components plumb and level with concealed devices, secured for long life under hard use.
- B. Complete equipment field assembly, where required, using methods indicated.
 - 1. Provide closed butt and contact joints that do not require a filler.
 - 2. Grind field welds on stainless-steel equipment smooth, and polish to match adjacent finish. Comply with welding requirements in "Fabrication, General" Article.

3.4 PROTECTION

- A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure stainless steel countertops are without damage or deterioration at the time of Substantial Completion.

3.5 ADJUSTING

- A. Touch-up minor scratches and abrasions.

END SECTION 05 58 00

SECTION 07 42 00 – MODULAR WALL

PART 1 – GENERAL

1.1 SUMMARY

- A. Modular wall panel box sections shall be finished on exposed side with type 304 stainless-steel, #4 finish, 16 GA, and consist of primary panels with a support channel. A finished stainless-steel panel shall not be provided on the mechanical, service side, of the modular wall. There shall be no visible fasteners on the outside viewing side of the panels. Coordinate with soffit by building and any exhaust canopies.

1.2 FIELD CONDITIONS

- A. Sectional modular wall shall be as indicated on the Drawings (length and height shall be field verified). Modular wall shall completely seal openings between equipment, walls, floors, and ceiling.
- B. Provide 36" x 84" stainless-steel door where noted. Provide standard door hardware.
- C. Unit to carry a one (1) year warranty.

END OF SECTION 07 42 00

SECTION 08 31 00 – ACCESS DOORS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Access Doors:
 - 1. Specialty access doors.

1.2 RELATED SECTIONS

- A. Section 09 21 16 – Gypsum Board Assemblies

1.3 SUBMITTALS

- A. Submit under provisions of Section 01 30 00 - Administrative Requirements.
- B. Product Data:
 - 1. Manufacturer's data sheets on each product to be used.
 - 2. Preparation instructions and recommendations.
 - 3. Storage and handling requirements and recommendations.
 - 4. Typical installation methods.
- C. Shop Drawings: Include details of materials, construction, and finish. Include relationship with adjacent construction.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with a minimum five years documented experience.
- B. Installer Qualifications: Company specializing in performing Work of this section with minimum two years documented experience with projects of similar scope and complexity.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store and handle in strict compliance with manufacturer's written instructions and recommendations.
- B. Protect from damage due to weather, excessive temperature, and construction operations.

1.6 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.

1.7 WARRANTY

- A. Manufacturer's standard limited warranty unless indicated otherwise.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: Acudor Products Inc.
- B. Requests for substitutions will be considered in accordance with provisions set forth in Division 01

2.2 SPECIALTY ACCESS DOORS

- A. Product: AS-9000 Specialty Doors Gasketed Access Doors. Designed to provide a gasketed fit in all types of walls and ceilings. This door is commonly used in clean rooms, laboratories, operating rooms, etc.
 - 1. Product Features:
 - a. Gasketed access door.
 - b. Formed door panel with reinforced edges and a concealed hinge, along with open cell gasket between the door and frame.
 - 2. Size: 24 x 24 inches.
 - 3. Door and Door Frame: Steel or stainless steel. Door and Frame: 18 ga. Flange to be 1 inch wide.
 - 4. Hinge: Concealed.
 - 5. Gasket: Pemko S88 adhesive-backed bulb silicone gasket.
 - 6. Latch and Lock: Stainless steel screwdriver operated cam latch.
 - 7. Finish: Stainless Steel: No. 4 satin polish.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly constructed and prepared.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions, approved submittals, and in proper relationship with adjacent construction.

3.4 CLEANING AND PROTECTION

- A. Clean products in accordance with the manufacturers recommendations.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION 08 31 00

SECTION 09 67 23 – RESINOUS FLOORING

PART 1 - GENERAL

1.1 SUMMARY

- A. Work Included: Provide and install multi-part resinous floor system, complete, as shown on Drawings and as specified, including:
 - 1. Locations: Areas as indicated by the Plan finish schedule.
 - 2. Provide preparation of substrate as recommended by the resinous flooring manufacturer.
 - 3. Provide and install cove base with trims and accessories as specified in this Section.
 - 4. Provide and install multi-part resinous floor system as specified in this Section.
 - 5. Provide and install sealant joint material for the Work of this Section as specified in this Section.
 - 6. Provide treatment of substrate cracks and control/construction joints as needed and specified in this Section.
- B. Related Work Specified Elsewhere:
 - 1. Division 03 30 00 – Cast-In-Place Concrete

1.2 SUBMITTALS

- A. Comply with provisions of Section 01 33 00 – Submittal Procedures.
- B. Product Data: Submit manufacturer's technical data, installation instructions, and general recommendations for each resinous flooring material required.
 - 1. Include certification that indicates compliance of materials with requirements.
- C. Samples: Submit, for verification purposes, 5-inch square samples of each type of resinous flooring required, applied to a rigid backing, in color and finish indicated.
 - 1. For initial selection of colors and finishes, submit manufacturer's color charts showing full range of colors and finishes available.
- D. Certificates: By manufacturer of resinous flooring; upon completion of Work, written statement that technical support to applicator and field supervision was sufficient to assure proper application of materials and that installation is acceptable.
- E. Maintenance Instructions: Submit manufacturer's written instructions for recommended maintenance practices.

1.3 QUALITY ASSURANCE

- A. Qualifications of the Applicator: Licensed or approved by the manufacturer of the coating system and has successfully completed 5 projects of similar size and complexity.
- B. Single Source Responsibility: Obtain primary resinous flooring materials including primers, resins, hardening agents, finish or sealing coats from a single manufacturer with not less than ten years of successful experience in manufacturing and installing principal materials described in this Section.
- C. Special Requirements: Regulatory Agencies: Use materials for Work of this Section which comply with volatile organic compound limitations and other regulations of local Air Quality Management District and other local, state, and federal agencies having jurisdiction.
- D. ISO 9001: All materials, including primers, resins, curing agents, finish coats, aggregates and sealants are manufactured and tested under an ISO 9001 registered quality system.

1.4 PRE-INSTALLATION CONFERENCE

- A. Comply with requirements of Section 01 31 19 – Project Meetings.
- B. Arrange a conference at the job site to coordinate resinous flooring and critical finish systems, to be attended by the General Contractor, Architect/Owner's Representative

1.5 PROJECT CONDITIONS

- A. New Type 1 concrete shall be properly cured for a minimum of 5 days and have sufficient strength to handle mechanical preparation.
- B. Utilities, including electric, water, heat (air temperature between 60 and 85°F/16 and 30°C) and finished lighting to be supplied by General Contractor.
- C. Job area to be free of other trades during, and for a period of 24 hours, after floor installation.
- D. Protection of finished floor from damage by subsequent trades shall be the responsibility of the General Contractor.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Material shall be delivered to job site and checked by flooring contractor for completeness and shipping damage prior to job start.
- B. All materials used shall be factory pre-weighed and pre-packaged in single, easy to manage batches to eliminate on site mixing errors.
 - 1. No on site weighing or volumetric measurements allowed.
- C. Material shall be stored in a dry, enclosed area protected from exposure to moisture.
 - 1. Temperature of storage area shall be maintained between 60 and 85-degrees F.

1.7 WARRANTY

- A. Manufacturer shall furnish a single, written warranty covering both material and workmanship for a period of one (1) one full year from date of installation, or provide a joint and several warranty signed on a single document by material manufacturer and applicator jointly and severally warranting the materials and workmanship for a period of (1) one full year from date of installation. A sample warranty letter must be included with bid package or bid may be disqualified.

PART 2 - PRODUCTS

2.1 RESINOUS FLOORING

- A. Colors:
1. As selected by Architect from manufacturer's standard colors.
- B. Resinous Flooring
1. Basis of Design: Stonclad UR with Stonkote HT4, total minimum thickness of 3/16" as manufactured and installed by Stonhard, Ph: (530) 902-1603, Contact: John Wagner, jwagner@stonhard.com.
 - a. Substitutions must be verified with Architect and Owner.
- C. System Components: Manufacturer's standard components that are compatible with each other and are as follows:
1. Primer (Urethane Primer)
 - a. Formulation: Three-component, urethane
 - b. Application Method: Squeegee and medium nap roller
 - c. Application Thickness: 4-6 mils
 2. Mortar Base (Stonclad UR)
 - a. Formulation: Four-component mortar consisting of urethane resin, curing agent, selected, graded aggregates blended with inorganic pigments.
 - b. Application Method: Steel Trowel
 - c. Application Thickness: 3/16" minimum
 3. Finish Coat (Stonkote HT4)
 - a. Formulation: Two-component, free flowing amine-cured bisphenol-F epoxy consisting of resin and curing agent.
 - b. Application Method: Squeegee and medium nap roller
 - c. Application Thickness: 4-6 mils
 - d. Number of Applications: 2
- D. Physical Characteristics: Provide resinous floor system in which the minimum physical properties of resinous floor including aggregate, when tested with standards or procedures referenced below, are as follows:

1. Compressive Strength: 5,000 psi (ASTM C579)
 2. Tensile Strength: 1,000 psi (ASTM C307)
 3. Flexural Strength: 2,000 psi (ASTM C580)
 4. Hardness: 80-84 (ASTM D2240/Shore D)
 5. Water Absorption: <1% (ASTM D648)
- E. Waterproof Membrane (Recommended in applications above grade and over occupied space):
1. Stonproof ME7: Two-component, liquid applied, polyurethane elastomer with 200% percent elongation per ASTM D412.
- F. Dynamic Cracks, Control and Construction Joints (if needed):
1. Stonproof CT5: Two-component, flexibilized epoxy membrane in conjunction with 10 ounce fiberglass engineering fabric.
- G. Integral Coved Base:
1. Stonclad UR with Stonkote HT4: Three-component, epoxy mortar with two-component finish coating applied to the height indicated on Drawings and Finish Schedule.
 2. Radius at floor/wall interface shall be at a $\frac{3}{4}$ " minimum.
 3. Metal Cove Termination Strip (optional): $\frac{1}{8}$ " x $\frac{1}{2}$ ", "L" shaped, zinc or equivalent metal, cove strip fastened to wall substrate at cove height indicated on Drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. General: Examine substrate to receive resinous flooring; give written notification of deficiencies. Do not proceed until unsatisfactory conditions are corrected.
1. Substrate must be dry and free of all wax, grease, oils, fats, soil, loose or foreign materials and laitance.
 - a. Laitance and unbonded cement particles must be removed by abrasive blasting, scarifying.
 - b. Other contaminants may be removed by scrubbing with a heavy-duty industrial detergent, "Stonkleen DG9", or equal; and rinsing with clean water.
 - c. The surface must show open pores throughout and have a sandpaper texture.
- B. Moisture Testing: Test only existing concrete with known moisture vapor transmission problems or those (new or existing) without a visqueen vapor barrier placed beneath the slab.
1. New Concrete: Testing of moisture in new concrete is not required.

2. Existing Concrete: Perform in situ probe test per ASTM F2170. If test results yield RH values greater than 85 percent then a moisture mitigation system may be required.
3. Perform additional moisture tests recommended by manufacturer. Proceed with application only after substrates pass testing.

3.2 PREPARATION

- A. Surface Preparation: Concrete preparation shall be by mechanical means and include use of a scabber, scarifier or shot blast machine for removal of bond inhibiting materials such as curing compounds or laitance.

3.3 MIXING

- A. General: Mix components only in amounts that can be applied within recommended application life.
 1. Discard materials not used within application life.

3.4 SYSTEM APPLICATION

- A. General: Apply each component of resinous flooring system in compliance with manufacturer's written directions to produce a uniform monolithic wearing surface of thickness indicated, uninterrupted except at divider strips, sawn joints or other types of joints (if any), indicated or required.
- B. Resinous Flooring:
 1. Primer: Mix and apply primer over properly prepared substrate with strict adherence to manufacturer's installation procedures and coverage rates. Coordinate timing of primer application with application of troweled mortar to ensure optimum adhesion between resinous flooring materials and substrate.
 2. Mortar Base: Mix mortar material according to manufacturer's recommended procedures. Uniformly spread mortar over substrate using manufacturer's specially designed screed rake adjusted to manufacturer's recommended height. Hand trowel apply mixed material over freshly primed substrate using steel finishing trowels or power trowel material using manufacturer's specially designed power trowel blades.
 3. Finish Coats: Remove excess unbonded granules by lightly brushing and vacuuming the floor surface. Mix and apply coating with strict adherence to manufacturer's installation procedures to both floor and cove base surfaces.
- C. Integral Cove Base:
 1. Mix and apply cove base mortar in conjunction with mortar base of resinous flooring at the height indicated on Drawings and/or Finish Schedule.
- D. Expansion/Isolation Joints:
 1. Stonflex MP7 Sealant: Mix and apply sealant to properly prepared cut joints (if any). The use of a polyethylene backer rod should be used in expansion and/or isolation joints. Sealant

shall be applied at a depth of half the width of the joint.

E. Dynamic Cracks, Control and/or Construction Joints:

1. Stonproof CT5: Prior to installation of Resinous Flooring, mechanically rout cracks and joints to a depth of 3/8" minimum and at a 45 degree angle to create a "V" into the concrete substrate following the crack and/or joint. Apply Stonproof CT5 at a 30 mil thickness six inches on each side of crack or joint and filling the "V". Immediately place 10 ounce woven fiberglass engineering fabric into uncured Stonproof CT5 and saturate with additional Stonproof CT5 applied with a medium nap roller.

3.5 FIELD QUALITY CONTROL

A. The right is reserved to invoke the following material testing procedure at any time, and any number of times during period of flooring application.

1. The Owner will engage service of an independent testing laboratory to sample materials being used on the job site. Samples of material will be taken, identified and sealed, and certified in presence of Contractor.
2. Testing laboratory will perform tests for any of characteristics specified, using applicable testing procedures referenced herein, or if none referenced, in manufacturer's product data.
3. If test results show materials being used do not comply with specified requirements, Contractor may be directed by the Owner to stop work; remove non-complying materials; pay for testing; reapply flooring materials to properly prepared surfaces which had previously been coated with unacceptable materials.

3.6 PROTECTION OF ADJACENT WORK

A. General: Resinous floor system will be installed in locations where other adjacent finish materials, including ornamental metal, lath and plaster, and other finish assemblies may already be in place. Protect all adjacent surfaces during installation and finishing.

1. Installed adjacent finishes shall be completely isolated from epoxy coating system installation. Provide Plastic ("Visqueen") wrap and mask all edges.
2. Provide constant supervision and immediate clean up throughout resinous floor system installation.
3. After resinous floor system has fully cured, remove protection from adjacent surfaces and wipe down surfaces using clean, cotton towels.

3.7 CURING, PROTECTION AND CLEANING

A. Cure resinous flooring materials in compliance with manufacturer's directions, taking care to prevent contamination during stages of application and prior to completion of curing process.

1. Close area of application for a minimum of 24 hours.

B. Protect resinous flooring materials from damage and wear during construction operation.

1. Where temporary covering is required for this purpose, comply with manufacturer's recommendations for protective materials and method of application.
 2. General Contractor is responsible for protection and cleaning of surfaces after final coats.
- C. Cleaning:
1. Remove temporary covering and clean resinous flooring just prior to final inspection.
 2. Use cleaning materials and procedures recommended by resinous flooring manufacturer.

END OF SECTION 09 67 23

SECTION 09 96 00 – HIGH-PERFORMANCE COATINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes surface preparation and the application of high-performance coating systems at
 - 1. Interior Substrates:
 - a. Concrete masonry units (CMU) walls
 - b. Gypsum board ceilings

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include preparation requirements and application instructions.
- B. Product List: For each product indicated, include the following:
 - 1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.

1.3 CLOSEOUT SUBMITTALS

- A. Coating Maintenance Manual: Provide coating maintenance manual including area summary with finish schedule, area detail designating location where each product/color/finish was used, product data pages, material safety data sheets, care and cleaning instructions, touch-up procedures, and color samples of each color and finish used.

1.4 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Paint: **1 gal.** f each material and color applied.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Delivery and Handling: Deliver products to Project site in an undamaged condition in manufacturer's original sealed containers, complete with labels and instructions for handling, storing, unpacking, protecting, and installing. Packaging shall bear the manufacture's label with the following information:
 - 1. Product name and type (description).
 - 2. Batch date.
 - 3. Color number.
 - 4. VOC content.

5. Environmental handling requirements.
 6. Surface preparation requirements.
 7. Application instructions.
- B. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
1. Maintain containers in clean condition, free of foreign materials and residue.
 2. Remove rags and waste from storage areas daily.

1.6 FIELD CONDITIONS

- A. Apply coatings only when temperature of surfaces to be coated and surrounding air temperatures are between 50 and 95 deg F
- B. Do not apply coatings when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Product: **Sherwin Williams Pro Industrial High Performance Epoxy**
- B. Comparable Products: Comparable products of approved manufacturers will be considered in accordance with Division 01 provisions and the following:
1. Products are approved by manufacturer in writing for application specified.
 2. Products meet performance and physical characteristics of basis of design product including published ratio of solids by volume, plus or minus two percent.
- C. Source Limitations: Obtain paint materials from single source from single listed manufacturer.
1. Manufacturer's designations listed on a separate color schedule are for color reference only and do not indicate prior approval.

2.2 HIGH-PERFORMANCE COATINGS, GENERAL

- A. Material Compatibility:
1. Provide materials for use within each coating system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 2. For each coat in a coating system, provide products recommended in writing by manufacturers of topcoat for use in coating system and on substrate indicated.
 3. Provide products of same manufacturer for each coat in a coating system.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers. Where acceptability of substrate conditions is in question, apply samples and perform in-situ testing to verify compatibility, adhesion, and film integrity of new paint application.
- B. Substrate Conditions:
 - 1. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - a. Concrete: 12 percent.
 - b. Concrete Masonry: 12 percent.
 - c. Gypsum Board: 12 percent.
 - 2. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
- C. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.
- D. Proceed with coating application only after unsatisfactory conditions have been corrected; application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.
- C. Clean substrates of substances that could impair bond of coatings, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
 - 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce coating systems indicated.

3.3 APPLICATION

- A. Apply high-performance coatings according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."
 - 1. Use applicators and techniques suited for coating and substrate indicated.
 - 2. Coat surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, coat surfaces behind permanently fixed equipment or furniture with prime coat only.
 - 3. Coat back sides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
 - 4. Do not apply coatings over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
- B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of the same material are to be applied. Tint undercoats to match color of finish coat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through final coat, apply additional coats until cured film has a uniform coating finish, color, and appearance.
- D. Apply coatings to produce surface films without cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections. Produce sharp glass lines and color breaks.

3.4 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing coating application, clean spattered surfaces. Remove spattered coatings by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from coating operation. Correct damage by cleaning, repairing, replacing, and recoating, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced coated surfaces.

END OF SECTION 09 96 00

SECTION 21 1313 - FIRE PROTECTION SYSTEMS

PART 1 - GENERAL

1.1 SCOPE

- A. Under Bid Alternate #1, a stainless steel enclosure will be constructed in the Dirty Cagewash room and will create an alcove that will require the addition of one or more sprinkler heads. Modify and make additions to the existing automatic sprinkler system to protect all remodeled areas of the Dirty Cagewash Room, as indicated herein and as shown on the drawings. This is a remodel to an existing automatic fire sprinkler system. Modify existing automatic sprinkler system as necessary for new work indicated on the contract drawings.
- B. Work to be performed under this section shall include, but not be limited to the following:
 - 1. Automatic fire sprinkler systems.
 - a. Wet pipe flow switch system.
 - 1) Pipe and fittings.
 - 2) Hangers and supports.
 - 3) Earthquake bracing.
 - 4) Sprinklers

1.2 RELATED WORK

- A. All work performed under this section of the specifications shall be subject to the requirements of both the General and Special Conditions.
- B. Related work specified elsewhere:
 - Supports, Anchors and Bases Section 22 0529
 - Piping and Equipment Identification Section 22 0553
- C. Examine the above referenced specification parts thoroughly before submitting a proposal for accomplishment of work in this section.

1.3 REGULATORY AGENCIES

- A. The term jurisdictional authority used in this section of the specification shall include, as applicable, but not be limited to the following:
 - 1. City of Bozeman Building Department.
 - 2. Bozeman Fire Marshall.
 - 3. Owner.
- B. The design and installation of all systems of fire protection shall conform to all requirements of applicable codes and publications herein defined:
 - 1. International Building Code (2021)
 - 2. Currently Adopted version of International Fire Code
 - 3. NFPA#13 (current adopted version)
 - 4. NFPA #10 (current adopted version)
 - 5. All State and local ordinances
 - 6. Underwriters' Laboratories
 - 7. American Society of Testing Materials
 - 8. American National Standards Institute
 - 9. Occupational Safety and Health Administration

1.4 SUBMITTALS

- A. General
 - 1. The successful Contractor shall provide submittal data as required under other portions of this specification. Submittals shall conform to the instructions set forth in the General and Special Conditions of these specifications entitled Shop Drawings and Submittals.
 - 2. Work on the project shall not begin until submittals have been accepted by the Engineer.
- B. Catalog/Product Information
 - 1. Full catalog information shall be submitted for approval for all materials intended for use on this project. Catalog information indicating more than one item shall be highlighted to clearly indicate the proposed equipment.
- C. Installer's Qualifications

1. All systems of fire protection shall be installed by a licensed (for the location of installation) Fire Protection Contractor, fully experienced in fire protection installation as required and specified herein.
2. All installers shall be competent and shall hold an endorsement by the State of Montana. Prior to beginning work, current Contractor's and Installer's license and endorsements shall be on file with the Department of Commerce Professional and Occupational Licensing Bureau (301 South Park, P.O. Box 200513, Helena, MT 59620-0513).
3. Fire Protection Contractors may be required to provide in writing specific information as to successfully completed projects and references to show cause as to why they should be considered acceptable to the engineer.

1.5 JOB CONDITIONS

- A. The Contractor shall investigate the structural, mechanical, electrical, and finished conditions affecting the piping, and shall arrange the equipment accordingly; furnishing required fittings, offsets and accessories. Route fire protection piping to avoid interference with duct work and drain piping. In the event it becomes necessary to make field changes in pipe locations due to building construction, the Contractor shall consult with the Engineer before making any changes. Any such changes required shall be made without added cost to the Owner.
- B. The Contractor shall determine, and be responsible for, the proper locations and type of inserts for hangers, chases, sleeves, and other openings in the construction required for fire protection work, and shall obtain this information well in advance of the construction progress to avoid delay of the work.
- C. The drawings indicate approximate locations of sprinkler head and conceptual routing of piping. Contractor is responsible for final locations and of new heads and pipe routing. All fees and permits specifically required for fire protection work, not obtained by others as specified elsewhere shall be applied for and paid for by this Contractor.

1.6 GUARANTEES AND WARRANTIES

- A. The Fire Protection Contractor shall guarantee to the Owner in writing, all equipment and workmanship for a period of one (1) year after the fire protection system has been placed in continuous service and has been accepted by all authorities having jurisdiction.

PART 2 – PRODUCTS

2.1 FIRE PROTECTION SYSTEM EQUIPMENT

- A. Where contract documents indicate specific model number or manufacturer; Contractor may substitute identical equipment approved for fire protection use. Similar equipment may be substituted if Contractor submits revised design, substituted materials, and revised calculations for approval.

2.2 AUTOMATIC SPRINKLERS

- A. Install sprinklers from reviewed shop drawings. Match existing sprinkler models.
- B. All sprinklers shall be of similar identical to existing.
- C. The operating temperature of sprinklers shall be as required by the specific location of installation.

2.3 PIPE AND FITTINGS

- A. Interior piping for automatic sprinkler system shall conform to NFPA #13 and as follows.
- B. Piping above ground with threaded fittings may be Schedule 40, Dyna Thread or equal black steel pipe with a corrosion resistance rating equal to or greater than 1.0. Threaded thinwall pipe with a CRR less than 1.0 shall not be used.
- C. Fittings for threaded and coupled pipe shall consist of cast iron or ductile threaded fittings joined with Teflon tape thread sealing compound or pipe joint compound. Pressure rating of fittings shall be as required for application.

2.4 HANGERS AND SUPPORTS

- A. Space pipe hangers in accord with the requirements of NFPA #13. Construct hangers, hanger rods, inserts and clamps as approved by the same.
- B. Manufacturers:
 1. Tolco
 2. Afcon
 3. Erico

4. Speedy Product (Super Screws)
5. Elco (Hanger Mate)
- C. Attachments to piping and threaded rods used for hanging of fire protection system piping shall be galvanized or cadmium-zinc plated.

2.5 EARTHQUAKE BRACING

- A. Furnish and install all earthquake bracing and restraint as required by NFPA #13, International Building Code, the authority having jurisdiction and the Owner's insurer.

2.6 SPECIALTIES

- A. Escutcheon Plates
 1. Where exposed piping passes through finish work, chrome plated or other finish acceptable to the Engineer wall plates shall be installed. Split wall plates or escutcheons shall be installed to fit snugly around piping. All wall plates shall be metal.
 2. Solid galvanized wall plates shall be used at both sides of all exterior walls.
- B. Piping Identification
 1. All fire protection system piping shall be labeled. See specification section 22 0553 for detailed requirements.

PART 3 – EXECUTION

3.1 DESIGN CRITERIA

- A. The fire protection system supplier shall design the piping to supply the system. Piping shall be laid out so as not to interfere with the installation of other piping, ductwork or light fixtures.
- B. All piping shall be run concealed wherever possible.
- C. All areas shall be designed in accordance with NFPA #13 criteria for Ordinary Hazard Group 1 except; corridors, offices and similar light hazard areas may be designed in accordance with the NFPA #13 criteria for Light Hazard.

3.2 INSTALLATION

- A. Where details of installation are not given, the installation shall be made using manufacturer's recommended practices or at the direction of the Engineer.
- B. Contractor shall complete the fire protection systems ready for operation, in all respects, as soon as possible. When system is complete and ready for continuous operation, activate the system for its intended use. After system has been activated for continuous use, water charges will be paid by the Owner.
- C. This Contractor shall remove from the building, all rubbish and unused materials due to or connected with this installation.
- D. The surface of all piping shall be cleaned and left ready for painting.

3.3 TESTING

- A. All testing shall be accomplished in accord with NFPA standards and requirements.
- B. This Contractor shall call for inspection and complete Contractor's Material and Test Certificates signed by the authority having jurisdiction.
- C. All new portions of the system shall be hydrostatically tested at not less than 200 psig pressure for a period of not less than two (2) hours or 50 psi above static pressure in excess of 150 psi for two (2) hours with no pressure drop in the system.
- D. All testing shall be witnessed by a representative of the Engineer or Owner.
- E. Where jurisdictional authority's standards are more stringent than the above test, they shall prevail.
- F. Furnish copies of Aboveground Test Certificate with close-out documentation.

END OF SECTION 21 1313

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DIVISION 22 - PLUMBING

SECTION 22 0000 - GENERAL PROVISIONS FOR PLUMBING

PART 1 GENERAL

1.1 SCOPE

- A. The scope of mechanical work for this project includes all work depicted on the mechanical and plumbing plans and the work specified in Divisions 22 and 23. The work includes installation of all work associated with the replacement of the cagewash unit and additionally includes modification and extension of existing piping systems and utilities to support the installation. Other areas that may be affected by work of this project will remain occupied and functional throughout the construction period. It is imperative, without exception, that any and all outages to all systems are prior approved by the Project Manager in advance.

1.2 CONTRACTOR QUALIFICATIONS

- A. Qualified Personnel. Every piping and plumbing system on this project shall be installed by qualified, licensed personnel, properly trained, experienced to perform installations, and in compliance with federal regulations.
- B. All plumbing installations (water, drainage, and steam systems) shall be provided under the direct oversight by personnel with a current U.S. (state) or jurisdictional licensure, at not less than journeyman level, with additional, responsible master plumber oversight.
- C. All welding and brazing shall be carried out by qualified welders and brazers (respectively) in accordance with ASME Code and American Welding Society (AWS) standards for the material, method, personnel qualifications, and size range utilized. Where laboratory air, vacuum or gas systems are utilized, pipefitters/plumbers with ASSE series 6010 medical gas installer certification is additionally required.
- D. All support contractors (system cleaners, test agencies, verifiers, cross-connection control device testers, etc.) shall be appropriately qualified in accordance with project requirements and jurisdictional code requirements.

1.3 BIDDING

- A. The Contractor shall provide labor, materials, equipment, items, articles, operations and methods listed, shown, scheduled, or mentioned on the drawings, and/or specified, including all incidentals required for their completion.
- B. The Contractor shall refer to the General part of these specifications, such as Instructions to Bidders, Special Conditions and DIVISION 1 for restrictions covering time that work can be performed in certain areas, noisy and dusty operations, sequence of work, access to restricted areas and similar types of work and operations.
- C. Take cognizance of any change required in this work which may be a direct result of any alternate bid item listed and include the price deemed necessary to meet the requirements of the respective alternate.

1.4 SUBSTITUTIONS

- A. Items in this Division are generally eligible for substitution in accordance with the General Conditions and Supplements thereto. Where a proprietary specification is written for a particular item, then only that item may be used.
- B. When the Project Manager deems it necessary, to assure satisfactory installation and compatibility with other equipment, piping, ductwork, electrical provisions and other appurtenances, the Contractor shall prepare scale drawings of the substitute item showing proposed location, connections, relation to other equipment and other pertinent data such as maintenance space requirements, electrical requirements, height and weight. Drawings must receive Project Manager's approval before the substitution is made.
- C. It is the Contractor's responsibility that the substitute item shall fit into the space allocated and that the item can be installed and function as intended. Should changes in the work of any Contractor become necessary as a result of any substitute item under this Division, such changes shall be arranged and paid for by this Contractor.
- D. Capacities of substitute items shall not be less than that of the specified item.

- E. The performance of the factory representative and supplier on past work will be a consideration in the approval process of substitute items.
- F. The final decision as to acceptability rests with the Project Manager.

1.5 CODES, REGULATIONS AND PERMITS

- A. All materials and equipment shall be new, approved by the governing authority, and be in new, undamaged condition when installed.
- B. Comply with the current edition as of the bid date of the International Mechanical Code, National Fire Protection Association Codes and Standards, Uniform Plumbing Code, International Building Code, National Fire Protection Association, and all other applicable Federal, State, County and City codes, regulations and ordinances. Comply with DIVISION 26 and all codes referenced therein for any and all electrical work accomplished under this Division or by this Contractor.
- C. Arrange for and obtain all permits and approvals required for the execution of the work.

1.6 INTENT OF DRAWINGS

- A. Pipe or duct risers and other diagrams are schematic only and not to scale. They are intended only to indicate sizes or relative arrangement of pipe and equipment shown elsewhere in plan view.

1.7 WORKMANSHIP

- A. Work shall be accomplished by workmen skilled in the particular trade, in conformance with best practices and to meet all applicable codes.
- B. This Contractor shall replace materials or equipment not properly installed or finished, without increase in payment received.

1.8 RESPONSIBILITY

- A. The Contractor is responsible for installation of a satisfactory and complete piece of work in accordance with true intent of the drawings and specifications.
- B. Consult all drawings for the project to predetermine that the work and equipment will fit as planned. Provide all information and services, as required, for completion of coordination drawings as may be specified in Division 1 or elsewhere in these specifications.
- C. The location of piping, ducts, equipment, etc., shall be checked to ensure clearance from openings, structural members, cabinets, lights, outlets, and equipment having fixed locations. This shall be accomplished prior to fabrication of pipe or ducts.
- D. If, at any time, and in any case, changes in location of piping, ducts, equipment, etc., becomes necessary due to existing obstacles or installation of other trades shown on any of the project drawings and such conflict could have been avoided by proper coordination between trades or proper pre-planning of work, such required changes shall be made by the Contractor at no extra cost. These changes are to be recorded on the record drawings.
- E. This Contractor is responsible to provide all incidental electrical interconnections, control wiring, etc., which are necessary for system completion and which are not specifically shown or otherwise indicated on the electrical drawings or specified in DIVISION 26.
- F. All electrical work incidental to or accomplished under this Division shall comply with all requirements of DIVISION 26.
- G. Contractor shall provide to the owner copies of Bill of Materials, invoices, and approved shop drawings for VFD's, motors, and other equipment required for use to apply for energy rebate programs.

1.9 DELIVERY AND STORAGE OF MATERIALS

- A. Make provisions which are acceptable to the Project Manager for delivery and storage of materials.
- B. Make provisions for introduction into the building of equipment furnished under this Division.
- C. Refer to DIVISION 1 for additional provisions to allow equipment passage into the building.
- D. The contractor shall install only new equipment and materials. The contractor shall protect all stored materials from weather, sunlight, dirt ingress and damage. Weathered, rusted or damaged materials shall not be installed and shall be immediately removed from the project site.

1.10 MANUFACTURER'S DIRECTIONS

- A. Manufactured materials and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned as directed by the manufacturer unless noted otherwise herein or on the drawings.

1.11 CUTTING, PATCHING, REPAIRING

- A. Cutting, patching and repairing required by the work of this Division shall be the responsibility of this Contractor.
- B. Work shall be performed in accordance with DIVISION 1 of these specifications.
- C. The performance of this work shall not weaken the structural integrity of the building.
- D. Any abrasion or disfigurement of the finished work or any portion of the building where any such abrasion or disfigurement is caused by the activities of the Contractor shall be repaired and neatly refinished to match the adjacent work.

1.12 OPENINGS IN PIPES AND DUCTS

- A. Openings in pipes and ducts shall be kept closed during progress of work.
- B. The Contractor is required to clean new systems found dirty to the satisfaction of the Project Manager at no additional cost.

1.13 CLEANUP

- A. Upon completion of work, remove materials, scraps, etc., relative to this work and leave the premises in a clean and orderly condition. This applies equally to finished, unfinished and concealed spaces.
- B. Clean equipment of dirt and debris.

1.14 SAMPLES

- A. The Contractor shall submit actual production samples on any material or equipment requested if, in the Project Manager's opinion, it is necessary in order to determine the quality, workmanship, operation, etc. of the item.
- B. Samples will be returned to the Contractor. Approved samples may be used on the job.
- C. Costs incurred in providing and returning samples will be the responsibility of the Contractor.

1.15 TEMPORARY SERVICES

- A. See DIVISION 1 GENERAL REQUIREMENTS for Temporary Facilities.

1.16 FIRE PROTECTION

- A. Metallic pipe, duct and other penetrations of all fire partitions, walls and floors shall be effectively fire-stopped to equal the fire rating of the floor or partition using materials and methods UL approved and tested to meet all conditions of ASTM E119, UL 1479 and ASTM E 814 tests. Firestopping materials shall carry a UL 'W' rating of Class 1 for water leakage. One such material is 3M Fire Barrier Watertight Sealant 1003SL or 1003NS. Other acceptable materials by Dow Corning, General Electric and other qualified manufacturers are not prohibited.
- B. Thermoplastic pipe and duct penetrations shall be fire stopped same as metallic penetrations with the addition of an intumescent wrap to effectively close the hole if the thermoplastic vaporizes.
- C. Construction of permanent bracing, framing, roof curbs and platforms or other structures which utilize wood construction shall be fabricated from fire resistant treated materials or shall be otherwise protected by approved fire-resistant materials.

1.17 ACCESS DOORS

- A. See architectural drawings and specifications for access door types. Assist in locating the access doors to avoid lights, ducts and piping and to provide the best access to overhead equipment, valves and balance dampers.

1.18 COMPLETION AND TESTS

- A. All systems and equipment shall be cleaned, purged free of contaminants, and tested and adjusted for proper operation and leak integrity. Systems shall be fully commissioned, including performance of integrated systems testing, comprehensive functional performance tests, and complete commissioning of the source equipment and distribution to point of delivery. Systems deemed hazardous or of critical purity shall be properly verified and, where specified in other sections, validated.
- B. Testing and system cleanings shall be conducted under supervised conditions. Systems under test pressures, unsafe temperature, and systems filled with cleaning or sanitization chemicals shall not be left unsupervised. All appropriate safety precautions shall be maintained to protect facility and occupants.
- C. Test methods and equipment shall not induce contamination, over-pressurization, or damage.
- D. Proper bleeding of air is required prior to hydrostatic testing.

- E. Complete and test each system as specified. Submit all reports required by the individual sections of specifications. Leave all systems in proper operation.
- F. At the time of finalizing the project, a demonstration of all systems shall be performed in the presence of the Project Manager's designated representative. The Contractor shall demonstrate that the systems perform in the manner described in the specifications and indicated on the drawings.

1.19 OPERATING INSTRUCTIONS

- A. The Contractor shall provide qualified personnel to instruct the Owner's maintenance personnel in the operation and maintenance of all the new systems and equipment. In general, these instructions may be given by the installer of the system. However, some equipment or systems require instruction be given by an authorized agent of the supplier or manufacturer. See Division 1 and individual Sections of this Division for specific training requirements.
- B. Written operation and maintenance instructions, as produced by the manufacturer, shall be provided for all equipment. These instructions shall be bound and submitted as described in this Section.

1.20 REMODELING WORK

- A. Wherever existing mechanical systems, plumbing, heating, service lines, piping, ducts, controls, etc., are cut, removed, or interrupted as a result of the contract work, all such items that serve areas or equipment that remain shall be replaced, rerouted, extended, relocated, etc., as necessary to maintain operation of equipment and services.
- B. Downtime shall be held to a minimum. Outages shall be scheduled at a time acceptable to and approved by the Project Manager. Consult with the Project Manager in sufficient time for him to make necessary preparations for the outage. Note specifically, that certain items of work may be accomplished in Phases and according to outage limitations as noted on the plans or elsewhere in the construction documents.
- C. Demolition
 - 1. Refer to the drawings for execution of demolition. Protect all items that are to be removed and reinstalled as if they were new.
 - 2. Unless specifically noted otherwise on the plans, all existing equipment and material removed and not scheduled for reinstallation shall remain the property of Montana State University and shall be delivered to a designated stockpile area on the MSU campus. The stockpile location shall be as designated by the Project Manager. Materials not wanted by the University shall be removed from the site by the Contractor.
- D. Asbestos Awareness
 - 1. If suspect asbestos materials are encountered, the contractor shall cease work in that area and inform the Project Manager of his suspicions and will not proceed with work in that area until such time that a determination can be made on how to proceed.
- E. Site Investigation
 - 1. The Contractor shall be cognizant that this is a remodeling project and as such, certain items cannot be fully illustrated or explained without field observation. Before submitting his proposal, the Contractor should examine the site and building as it pertains to this project and make allowances in his proposal for all conditions that will affect the work indicated in the project manual and contract documents. This would include hidden and other discovered obstacles such as existing pipes, ducts and equipment not necessarily shown on the project drawings.
- F. Site access may be arranged by contacting the Project Manager.

1.21 RECORD DRAWINGS

- A. A separate set of mechanical drawings shall be maintained at the job site at all times and shall be used as record drawings. This set shall be kept up to date with all changes and/or additions in the construction and/or mechanical systems, and shall be delivered to the Project Manager at the completion of this project. This set of drawings shall be kept clean and protected at all times. See Division 1 for additional requirements.
- B. The Project Manager will review the drawings periodically as the project progresses.

PART 2 SUBMITTALS AND BROCHURES OF EQUIPMENT

2.1 GENERAL

- A. The literature required to be submitted and approved in order to fulfill the requirements of this Division falls into two general categories. These are the "Brochures of Equipment" and "Submittals."

- B. "Submittals" is a general term for informational literature which must be supplied to and approved by the Contractor and the Project Manager prior to installing, receiving, or in some instances, even ordering equipment. The normal required types of submittals include shop drawings, manufacturer's literature, installation and operation instructions (from the manufacturer) and wiring diagrams. System reports, such as start-up reports or balancing reports, are forms of submittals which are required after the equipment has been installed and is operational.
- C. Brochures of Equipment (also known as Operations and Maintenance Manuals) are booklets assembled by the contractor which contain operation, maintenance and repair literature for all equipment installed under the requirements of the project. They will be used by the Owner's personnel as the primary source of information for operating and maintaining the installed systems. As such, they shall exhibit a professional quality, high degree of clarity and technical completeness which will allow their use throughout the useful life of the installed system.
- D. In general, copies of all returned, approved submittals shall be included in the Brochures of Equipment. These books shall also include complete operation and maintenance literature for each piece of equipment such as may be packaged with the equipment for OEM components. They will be used by the Owner's personnel as the primary source of information for operating and maintaining the installed systems and as such, they shall exhibit a high degree of clarity, thoroughness and be arranged so as to be useful for their given purpose throughout the life of the installed systems.

2.2 SUBMITTALS

- A. Refer to DIVISION 1 for submittal requirements. The Contractor shall submit all information listed in the individual Sections of this Division and as described in Division 1.
- B. The contractor shall procure manufacturer's literature and/or certified prints for all items of equipment, materials or systems on the job. Shop drawings and literature shall be complete and marked showing name of job, item used, size, dimensions, capacity, rough-in, etc., as required for complete check and installation. Any exceptions of the equipment being furnished from that specified shall be clearly defined. Specific requirements of submittals may be expanded in individual specification sections. Minimum requirements shall include the following:
 - 1. Submit actual installation layout drawings on floor plans showing the systems as noted in the specification.
 - 2. Manufacturer's literature shall include any and all restrictions on the application and installed service limitations of the product.
- C. All shop drawings shall be reviewed, approved and stamped by the Contractor before ordering.
 - 1. The Contractor shall check submittals for number of copies, adequate identification, correctness and compliance with drawings and specifications and apply his stamp of approval before forwarding the submittal. Submittals shall be revised, changed and/or resubmitted until acceptable and approved by the Project Manager.
 - a. Approval of submittals and literature by the Project Manager shall not relieve the Contractor from responsibility for deviations from drawings or specifications, nor shall it relieve him from responsibility for errors in shop drawings or other submittal literature.
 - b. Submit number of copies as required in DIVISION 1 for review.
 - c. Copies produced on copy machines which are not of a permanent or legible nature will not be accepted for shop drawing submittals. Copies must be legible with all dimensions and other pertinent data clear.
 - d. Equipment for no more than one section of specifications shall be included in each submittal.
 - e. Submittals will not receive partial approval. They will be either accepted or rejected in their entirety.

2.3 BROCHURES OF EQUIPMENT (AKA OPERATION & MAINTENANCE MANUALS)

- A. The Contractor shall prepare and submit electronic/digital operations and maintenance manuals, also referred to herein as Brochures of Equipment, for all systems and equipment. Each shall contain all required submittal data for the construction materials and each piece of equipment installed under this project. The literature required for submittal purposes shall be expanded to include operation and maintenance literature for each piece of equipment. Maintenance information shall be complete in every respect and shall include parts lists and assembly drawings wherever applicable. The Brochures shall also include a copy of the submittal requirement list. The manuals shall also meet all the requirements of Division 1.

- B. All literature shall clearly indicate the equipment it represents and shall be labeled with the equipment identification abbreviation found on the drawings, e.g. EF-1, etc. All information which is not applicable to the particular model and size supplied shall be clearly and neatly crossed out with heavy black marker or other suitable means. This includes dimensional drawings, maintenance information, parts lists, wiring diagrams, etc. Only the information applicable to the particular equipment supplied shall remain and it shall be easy to follow. Booklets not meeting these requirements shall be returned for correction.
- C. Formatting and media type shall be as specified in Division 1.
- D. Dividers shall be used to separate the literature for equipment supplied under each of the various Sections of this Division. Divider headings shall read the same as the Section title e.g. "22 0523 VALVES."
- E. The format of the Brochure shall begin with the submittal requirement list at the front as an index sheet. The dividers for each section shall then progress sequentially.
- F. Authorization for final payment shall not be made prior to final acceptance of the Brochures of Equipment.
- G. Submittal of Brochure of Equipment will be required early in the construction schedule. See Division 1.

END OF SECTION 22 0000

SECTION 22 0517 - PLUMBING AND PIPING ACCESSORIES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SYSTEMS

- A. This Section governs the materials and installation of accessories used in the installation of piping systems.

1.3 SUBMITTAL DATA

- A. See Section 22 0000 for general submittal requirements.
- B. Provide submittal data for any materials or equipment specified in this Section and any special or additional data as requested by the Project Manager.

PART 2 - PRODUCTS

2.1 ESCUTCHEONS

- A. Provide chrome-plated, one-piece escutcheons on all uninsulated pipe penetrations through walls, floors and ceilings. Split ring escutcheons shall not be used. Escutcheons shall fit snugly to pipes or insulation.
- B. Penetrations of insulated pipe with an outside diameter of 3" or less shall be fitted with escutcheons as described in paragraph 'A' above.
- C. Penetrations of insulated pipe over 3" outside diameter shall be fit with split closure plates cut from 24-gauge 304 stainless steel. The closure plate notches shall fit tight to the pipe insulation. Fasten the plates to the wall surface with sheet metal screws.

2.2 SLEEVES

- A. Sleeves in walls shall be constructed of cast-iron pipe, galvanized steel or 18 gauge or heavier G90 galvanized sheet metal with longitudinal seam. Sleeves shall fit snugly to the pipe or insulation jacket and be cut flush to the wall, floor or ceiling surface.

PART 3 EXECUTION

3.1 ESCUTCHEONS

- A. Seal around pipe penetrations in gypsum board to make them essentially air-tight. It is the intent of this specification that air not pass freely from one space to the next, including the ceiling cavity, in order to preserve pressure relationships and prevent the passage of steam or other contaminants. Escutcheons shall be made to fit snugly to the pipe or insulation jacket and tight against the wall, floor or ceiling surface.

3.2 SLEEVES

- A. All pipe penetrations through walls shall be sleeved.
- B. Pipe penetrations through all fire-rated floors, walls and ceilings or other fire-rated assemblies shall be sealed to maintain the fire rating. See Section 22 0000 "General Provisions for Plumbing" for sealant material.
- C. Each sleeve shall extend entirely through its respective wall penetration and shall be cut flush with the surface on each side.
- D. Each sleeve or hole shall be sized to provide 1/4" clearance (minimum) around the perimeter of the passing pipe or its insulation.
- E. Ream sleeves to remove sharp edges and burrs. Seal all sleeves to wall surfaces.
- F. Provide any special sleeves and sealants as detailed on the plans.

END OF SECTION 22 0517

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SECTION 22 0523 - VALVES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 WORK INCLUDED

- A. This Section governs the products used and the installation of all valves not specifically covered by other Sections of specifications.
- B. Valves covered elsewhere in the specifications shall be installed as indicated in their respective Section and in accordance with Part 3 'Execution' of this Section.
- C. Where specific valve types are noted on the plans, provide only those type of valves. Where specific types of connection are specified, provide only valves with the specified type of connection (e.g. threaded). Conform to the requirements of this section for all valves.

1.3 RESTRICTIONS

- A. Valves of the same type or function shall be of the same manufacturer throughout the job.
- B. Each valve shall have the manufacturer's name or symbol stamped or cast on the valve body.
- C. All valves shall be suitably rated for each application in regard to temperature, pressure and fluid type.
- D. All valves shall be designed and manufactured to the requirements of applicable federal specifications for the type and pressure class of valve.
- E. All valves used for potable water service and laboratory service shall be code-approved, certified lead-free and listed for use with potable water. Where model numbers indicated herein or on the plans do not necessarily indicate these versions, provide the version of those products meeting these requirements or an acceptable substitute product.

1.4 SUBSTITUTIONS

- A. Substitution of the scheduled valves is allowable unless a single specific model is called out in this Section or on the plans. See Section 22 0000 "General Provisions for Plumbing" for general requirements of substitutions.
- B. Substitute materials shall be equal or superior to the scheduled items in every respect. This includes design, materials of construction, ratings and adherence to federal specifications for design and manufacture.
- C. Sole authority regarding the acceptability of proposed substitutes rests with the Project Manager.

1.5 SUBMITTALS

- A. See Section 22 0000 "General Provisions for Plumbing" for general submittal requirements.
- B. All submittals shall clearly identify all features and materials of valve construction and information regarding compliance with applicable federal specifications. Items intended for use shall be clearly indicated and the intended application, e.g. low pressure steam, domestic cold water, etc., shall be listed.
- C. Submittals for substitute items shall clearly indicate any differences from, or exceptions to, scheduled valves.
- D. Provide manufacturer's installation instructions for all butterfly valves and all soldered connection valves. Provide installation instructions for all other valves as requested by the Project Manager.

PART 2 PRODUCTS

2.1 GENERAL

- A. All valves and their components shall be new, clean and free of corrosion or other damage.
- B. Valves showing signs of damage or corrosion shall be removed from the job site.

2.2 SPECIALTY ITEMS AND ACCESSORIES

- A. Provide specialty operators (e.g., chain operators, etc.), indicators, locks and stops, etc., as noted herein, shown on plans or required for proper function of the valve.

2.3 ACCEPTABLE MANUFACTURERS

- A. Equivalent products of Crane, Conbraco, Jomer, Hammond, Nibco, Milwaukee, Rockwell, Victaulic or Watts are acceptable.
- B. Manufacturers of specialty valves are approved only for the specified model. Approval of general product lines are not necessarily intended.

2.4 REQUIREMENTS OF DESIGN AND CONSTRUCTION

- A. Unless otherwise noted, all valves shall be pressure rated and stamped as listed below by application. Valves not stamped or valves used for other than water systems (e.g. deionized water, etc.) require manufacturer(s) certification for the intended application.
 - 1. General water systems: 125 SWP and 200 WOG.
- B. Valve design features shall be as listed below for each type of valve unless otherwise approved.
 - 1. Gate Valves
 - a. Valves 2" and under water: Bronze body, rising stem, removable bonnet, threaded connections.
 - 2. Ball Valves
 - a. Valves shall have flanged or threaded connections unless otherwise specifically approved. Unless otherwise indicated, all valves shall be fitted with insulated lever operators, memory stops and extended stems for insulated piping. Ball valves shall have stainless steel stems and seals unless otherwise noted.
 - b. Valves shall be two-piece or three-piece full port design.
 - c. All valves shall have stainless steel ball and trim.
 - 3. Check Valves
 - a. General purpose check valves for water shall be rated 125 SWP and 200 WOG.
 - b. General purpose valves 3" and smaller for water: Bronze and/or stainless-steel construction, horizontal or Y-pattern design with threaded bonnet and renewable disk. Threaded or solder connections.
 - 5. Drain Valves
 - a. Bronze body ball valve with stainless steel trim, integral hose thread, metal cap and chain. **Valves shall be rated not less than 600 CWP. Valves connected to domestic water piping or non-potable water piping derived from potable water piping, shall be fit with an ASSE 1001 low lead hose connection vacuum breaker backflow preventer similar and equal to Watts model LF8.**
 - b. Boiler drains and sill cocks shall not be used.

2.5 SCHEDULES

- A. General water systems:

VALVE CONNECTION			MODEL NUMBER	
TYPE	TYPE	MANUFACTURER	UP TO 3"	OVER 3"
Gate	Flange	Nibco		F-637-33
Ball	Solder	Nibco	S585-80/66(2"& smaller)	T-595Y66SS
	Thread Flange	Nibco -Submit on proposed valves-	T585-80/66	
Check (General Purpose)	Solder	Nibco	S-413-Y-LF	
	Thread Flanged	Nibco	T-413-Y-LF	F-938-33

- B. Drain valves
 - 1. Nibco No. T-585-70-66-HC-LF ball valve with stainless trim, integral hose thread, metal cap and chain.

2.6 EXCEPTIONS TO SCHEDULES

- A. Availability of sizes and connection types for listed models may be limited in some cases. In such an instance, flanged connections may be used for valves less than 2" in size but threaded or soldered connections on sizes larger than 2" will not be allowed without the Project Manager's approval.
- B. When model numbers are identical for valves with seats or discs of different composition, the materials appropriate for the intended service shall be supplied.

2.7 APPLICATION

- A. In general, install valves of the type and size indicated on drawings.
- B. Ball valves shall be used where indicated on plans and shall generally be used in lieu of gate valves provided they meet the service ratings of the application. However, gate valves shall be used where specifically indicated.

PART 3 INSTALLATION

3.1 GENERAL

- A. Orient axis of valve stems so that in the event of stem packing leakage, fluid will not drip or run on pipe(s) below. Example: rotate valves on horizontal pipe 45° from vertical.
- B. Service and tighten all packing glands on valves so equipped so there is no leakage. Replace defective packing.
- C. Install drain valves in all locations indicated on plans and in all additional locations necessary to allow complete system drainage.
- D. Label or tag valves as specified.
- E. Identify and turn over any loose valve keys or operators.

END OF SECTION 22 0523

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SECTION 22 0529 - SUPPORTS, ANCHORS AND BASES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Support all piping and equipment supplied under Division 23 as specified herein.

1.2 MATERIAL COMPATIBILITY

- A. Hangers, clamps, anchors, guides and other supports in contact with copper or brass pipe and tubing shall be compatible nonferrous material or plastic coated. Any products used outdoors shall be hot dip galvanized.
- B. All materials shall be free of rust, oil and dirt and shall be suitable for painting. Rusted materials shall be promptly removed from the site.
- C. **All hangers, struts, hardware and components used on this project shall be hot dip galvanized or constructed of stainless steel. Plated galvanized finish and painted finish materials shall not be used.**

1.3 STANDARDS

- A. The standards of the Manufacturers Standardization Society of the Valve and Fittings Industry (MSS) publications MSS SP-58 and SP-69 shall be met by the materials used on the project.

1.4 CODES

- A. Comply with the 2021 Uniform Plumbing Code and all manufacturer's installation instructions.

1.5 DEFINITIONS

- A. MSS: Manufacturer's Standardization Society.

1.6 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Signed and sealed by a qualified professional engineer. Show fabrication and installation details and include calculations for the following; include Product Data for components:
 1. Trapeze pipe hangers.
 2. Metal framing systems.
 3. Pipe stands.
 4. Equipment supports.

1.7 SUBMITTAL DATA

- A. See Section 22 0000 "General Provisions for Plumbing" for general submittal requirements.
- B. Provide manufacturer's literature for all products specified in this Section which will be installed under this project.
 1. Submittal shall be marked to indicate the hanger, support, etc., which is to be used and shall also indicate which system it is to be applied to.

1.8 SPECIALTY HANGERS AND SUPPORTS

- A. Provide all custom fabricated supports, anchors and braces as noted on plans. Provide specialty hangers and specific components where noted on plans or details.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Equivalent products of Fee and Mason, Kindorf, Grinnell, Elcen and Unistrut and B-Line are acceptable.

2.2 ANCHORS

- A. Anchors shall be provided wherever necessary or indicated to localize expansion or to prevent pipe rattle or undue strain on piping. Anchors shall consist of steel collars with lugs and bolts for clamping and attaching anchor braces, unless otherwise indicated.

2.3 HANGERS

- A. Insulated Piping: 3/8" through 1" pipe size, Anvil Figure 65 adjustable clevis.
- B. Insulated Piping: Over 4" pipe size, Anvil Figure 590 Adjustable roller hanger.

- C. Uninsulated Piping: 1/2" through 6" size pipe, Anvil Figure 69 adjustable swivel ring.
- D. Cast Iron Pipe: Pipe size through 3", Anvil Figure 65 adjustable clevis.
- E. Cast Iron Pipe: Pipe size larger than 3", Anvil Figure 590 adjustable clevis.

2.4 PROTECTION SADDLES & SHIELDS

- A. Hangers for pipe insulated with fibrous insulation shall incorporate either a rigid insulation insert with a factory fabricated half diameter galvanized shield or a weld-on type saddle at each hanger. Clevis type hangers with inserts shall utilize Anvil Fig. 168 'Rib-Lok' protection shield or equal. Protection saddles manufactured by the contractor without centering ribs or flared ends shall not be allowed. Shields, saddles and hangers shall be sized for the outside diameter of the applied insulation.
- B. Any piping systems insulated with closed cell foam and shall use matching hinged insulation insert such as Armacell brand Armafix insulated pipe hanger inserts or equal.

2.5 TRAPEZE HANGERS AND FLOOR SUPPORTS

- A. Trapeze type of hangers (with piping on top of the strut or trapeze) are not allowed for use to support grouped piping systems which are subject to pipe movement from expansion or contraction or systems which require upward or downward slope for air removal or gravity drainage unless they are specifically detailed on the plans or are specifically approved by the Project Manager on application.
- B. Trapeze hangers will be allowed to carry non-insulated pipes and conduits which are not subject to movement and which are not required to slope.
- C. Trapeze hangers will not be allowed to carry insulated piping.
- D. Electrical conduits shall not be hung on hangers with service pipe.
- E. Trapeze hangers and floor supports which carry more than one pipe shall be spaced according to the smallest diameter pipe.
- F. Horizontal load bearing members for more than one pipe shall be constructed of zinc coated angle iron or manufactured structural channel similar and equal to stainless steel or hot dip galvanized B-Line series 22. The corners of all supports shall be cut or ground to minimize the chance of injury to personnel. Size horizontal members to carry the pipe load plus 200 lbs.
- G. Pipes shall be secured to every support using zinc-coated clamps with factory elastomeric liners, similar and equal to B-Line 'Vibra-Clamp' BVT series with elastomer lining rated for a temperature range of -40°F to +300°F.
- H. Floor supports shall have vertical members constructed of strut and shall be sturdy enough to withstand substantial overloading, such as would be encountered if a worker stepped on the supported piping. Square post bases manufactured specifically for the strut being used shall be bolted to the base of all vertical supports and shall be secured to the floor with no less than two anchors. Post bases shall be large enough to withstand lateral forces from any direction.

2.6 METAL STRUT - SUPPORTS AND FRAMES

- A. Provide all specific strut models, materials, fasteners, clamps and accessory parts indicated on the plans. All ends of strut shall be cut square and ground or filed to remove burrs and sharp edges and corners.
- B. Strut for general use shall be 1-5/8" x 1-5/8" x 12 gauge steel, factory pre-galvanized to ASTM A525 G90 standards, with 9/16" holes or slots factory-pre-punched at 2" centers on one side. Brackets, fasteners and accessories shall be stainless steel or hot dip galvanized.
- C. Strut used to support pipes and equipment located in cagewash or sterilizer rooms or other spaces as noted on the drawings shall be constructed of 6063 T6 aluminum or type 304 stainless steel.
- D. The ends of all struts located in exposed or accessible spaces shall be covered with plastic or vinyl end caps for the protection of personnel. Caps shall be push-on or snap-in as offered by the strut manufacturer specifically for this purpose.
- E. Corner brackets, straps and structural fittings for support stands, assemblies and braces shall be designed to use not less than three fasteners. Post bases shall be a minimum of 4"x4" with a receiver cup for the post base. Angle brackets shall not be used to secure post bases.
- F. Pipe clamps shall be designed for use and be factory supplied, with elastomeric pipe isolation material to prevent direct contact between the pipe and the clamp/strut assembly similar and equal to B-Line 'Vibra-Clamp' BVT series with elastomer lining rated for a temperature range of -40°F to +300°F.

2.7 ATTACHMENTS

- A. Supports, anchors and guides shall be attached to structural framing members, concrete slabs or masonry walls. Where supports are required between structural framing members, suitable intermediate framing shall be provided.
- B. Hanger rods shall be the same diameter as the hanger tapping. Use Anvil Fig. 146 rod, or as approved. All hanger rods shall be galvanized. No rod shall be smaller than 3/8" diameter. Hanger rods shall be trimmed to within 1" of the bottom of all horizontal struts or members they support. Edges shall be ground smooth and the end of the rod covered with a push on plastic or rubber cap.
- C. Steel beam and joist attachments - Anvil Fig. 88, 92, 93 or 94 beam clamp with Fig. 89 retaining strap.
- D. Concrete inserts: Zinc-coated B-Line Series B-52 in length as required. Anvil Fig. 152 or 282 for single hangers, or as called out on details on plans.
- E. Use expansion shield bolts for fastening to concrete.

2.8 BASES

- A. Concrete bases for vibration control or housekeeping shall be provided for all major equipment and for any items so noted or wherever indicated on the drawings. Provide pads under all water heaters, water softeners, reverse osmosis water purification system tanks and components, vacuum units, air compressors and base mounted water pumps. Bases/pads shall be not less than 12" wider and longer than the equipment being supported or the frame of the equipment or isolation bases being supported.
- B. Bases shall be provided as a part of this DIVISION of the specifications but shall be done in accordance with the requirements of DIVISION 3 - CONCRETE.
- C. See structural drawings for reinforcing details.

PART 3 EXECUTION

3.1 ANCHORS

- A. Anchor braces shall be installed where indicated or required and in the most effective manner to obtain the desired restraint.
- B. Supports, anchors, or stays shall be attached in places where such supports will not injure the construction during installation or damage the structure by the weight or expansion of the pipeline.
- C. Anchor, block and brace pipe to prevent movement and rattle from water surges and hammer.

3.2 HANGERS

- A. Chain, wire strap, or other makeshift devices will not be permitted as hangers or supports.
- B. Provide hangers for all pipe. Support risers and brace pipe for stability.
- C. Beam clamps shall be provided with retainers to prevent them from slipping off the beam.
- D. Provide appropriate type of concrete inserts, or expansion shield bolts as noted on the drawings or as required for fastening to concrete structures.
- E. Spacing of Hangers and Supports
 - 1. A hanger or support shall be installed not over one foot from each change in direction of piping.
 - 2. Hangers and supports for continuous straight runs of piping shall not exceed the spacing listed below or as indicated in ANSI MSS SP-58-2018 Table 4, whichever is more stringent.

Type of Pipe	Size	Maximum Spacing
Steel	Up thru 1 1/4"	7'-6"
Steel	1 1/2" thru 3-1/2"	10'-0"
Steel	4" thru 5"	14'-0"
Steel	6" and Up	16'-0"
DWV Copper	1-1/4" thru 1-1/2"	5'-0"
DWV Copper	2" thru 2-1/2"	7'-6"
DWV Copper	3" thru 4"	10'-0"
Type L or M Copper	Up thru 1"	5'-0"
Type L or M Copper	1-1/4" thru 1-1/2"	6'-0"
Type L or M Copper	2" and Up	8'-0"
Cast Iron Soil Pipe	All	1 per length (adj. to joint) (adj. To joint)

3. In addition to the above maximum spacing, additional hangers shall be used at, heavy valves, multiple soil pipe fittings, etc., as necessary to prevent sagging and strain on equipment and fittings.
4. Piping shall be supported independently from pumps and other in-line equipment so that equipment can be removed without the need for pipes to have temporary support.
5. Hangers shall be laterally spaced at a distance from each other and from other obstacles sufficient to install pipe insulation without shaving insulation.

3.3 HANGER ADJUSTMENT

- A. All hangers shall be adjusted to equally support pipe systems and equipment. Adjustment to be made after the systems are filled and operating.

3.4 PROTECTION SADDLES AND SHIELDS

- A. A protection saddle shall be installed at each pipe hanger.
- B. Wood blocking shall not be used to support insulated pipe. See Section 22 0719 "Plumbing Systems Insulation" for required rigid support insulation materials.

3.5 EQUIPMENT MOUNTING

- A. Wall and Roof Mounting
 1. Wall-mounted equipment, such as plumbing fixtures and heating/cooling units shall be securely fastened to the wall using appropriate fasteners such as epoxy anchor systems made by Hilti or similar. Provide and install hangers and support frames for rigid support. Provide backing in any wall or soffit framing as required.
 2. Provide roof curbs, curb extensions and supports for roof mounted fans. Provide specialty curbs as may be noted on plans. Provide seismic restraint for all fans on extended curbs. Anchor all sides of fan skirts to their respective curbs.

3.6 PAINTING

- A. Unless otherwise indicated, factory hangers and supports and equipment supports which are custom fabricated or are supplied bare or with only a factory primer coat shall be painted with epoxy coatings as described in DIVISION 9 or as approved by the Project Manager.

END OF SECTION 22 0529

SECTION 22 0553 - PIPING AND EQUIPMENT IDENTIFICATION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Section 23 0553 "Identification for HVAC Piping, Equipment and Ductwork" shall be used in conjunction with this Section to identify mechanical systems and equipment. Variable frequency drives for fans and pumps shall also be identified as noted in this Section.
- C. Fire sprinkler piping shall be identified as described in this Section.
- D. Identify all piping, equipment and ductwork specified in Division 23 in accordance with this Section.

1.2 STANDARDS

- A. Piping, valves and equipment listed herein shall be identified as set forth in ANSI A13.1-2007 SCHEME FOR THE IDENTIFICATION OF PIPING SYSTEMS.

1.3 SUBMITTAL DATA

- A. See Section 22 0000 "General Provisions for Plumbing" for general submittal requirements.
- B. Provide submittal data for any materials or equipment specified in this Section as listed on the Submittal Schedule (see Section 22 0000) and any special or additional data as requested by the Project Manager.

PART 2 PRODUCTS

2.1 MANUFACTURER

- A. Markers and tags shall be as manufactured by Seton Name Plate Corporation, or approved equal.

2.2 PIPING IDENTIFICATION

- A. Pipe markers to be Seton's "Setmark" semi-rigid plastic snap-on markers with nylon ties. Pressure-sensitive stick-on markers shall not be used. All markers shall have direction of flow arrows. Markers for pipe or pipe coverings up to 6" in diameter shall be the self-securing snap-on type and shall wrap entirely around the pipe and overlap at least 1/8 wrap and sit flat on the pipe or insulation. Markers on pipe or coverings 6" in diameter and over shall be secured with nylon ties.
- B. Identify the following systems:
 - Equipment Drain
 - Domestic Cold Water
 - Domestic Hot Water
 - Domestic Hot Water Recirculation
 - Laboratory Cold Water
 - Laboratory Hot Water
 - Laboratory Hot Water Recirculation
 - Fire Sprinkler
 - Laboratory Air
 - Steam
 - Low Temperature Condensate Return
 - High Temperature Condensate Return
 - Sanitary Vent
 - Roof Drain
- C. The Project Manager will provide proper color for piping identification.

2.3 VALVE TAGS

- A. Tags shall be Seton's engraved "Setonply" laminated plastic, or equal, with colored surface and white engraved lettering. Minimum tag size to be 1" x 3", minimum lettering height to be 3/16".
- B. **Provide 20 tags with snap-closure brass chains for fastening to valve stems or handles. Custom engrave each tag as instructed by the Project Manager with numbers and letters. Provide tags in up to ten colors (total for plumbing and mechanical) to designate the system being identified. Colors shall be as selected by the Owner.**

2.4 EQUIPMENT NAME PLATES and PLACARDS

- A. Name plates shall be Seton's engraved "Setonply" laminated plastic, or equal, with black surface and white engraved wording. Minimum tag size to be 1-1/2" x 4", minimum lettering height to be 3/8".
- B. Each piece of equipment scheduled on the drawings shall be identified with a name plate. The identification shall be the same as used on the drawings (e.g. "WATER HEATER WH-1").
Additionally, each variable frequency drive for fan and pump application shall be labeled with the name of the piece of equipment it serves.
- C. The naming convention for all equipment shall be as designated by the Project Manager to align with final naming conventions for all rooms and spaces.
- G. Provide additional placards as noted for VFD's and for other items as noted in specific sections of Division 22 and Division 23 specifications.
- H. Provide up to 5 additional placards with wording and location to be identified by the Project Manager. These may be used for valves, equipment or elsewhere at the discretion of the Project Manager.

2.5 DUCTWORK IDENTIFICATION

- A. All ductwork shall be labeled for its use and its associated equipment (e.g. "SUPPLY AIR TO CAGEWASH). Duct labeling shall be by stencil and paint with letters not less than 3" in height and shall include direction of flow arrows at all labels.

PART 3 EXECUTION

3.1 INSTALLATION SCHEDULE

- A. Identification of pipe, valves and equipment shall be done near the end of the project after finish work such as insulating and painting has been completed.

3.2 PIPING IDENTIFICATION

- A. Piping shall be identified at locations described herein and any other specific location as directed by the Project Manager. Markers shall be installed in accordance with manufacturer's instructions in all locations listed below. Arrange markers uniformly and consistently throughout, grouping and staggering them in a neat and uniform manner.
 - 1. Adjacent to each hand valve or temperature control valve, balancing valve, drain valve, or union.
 - 2. At each branch take-off.
 - 3. At each pipe passage through wall, floor, or ceiling (on each side).
 - 4. At each access door.
 - 5. On all runs at least every 30 feet.
 - 6. At every major valve at least 4 feet from exit or entrance to equipment.
 - 7. Where items requiring routine service are concealed above ceilings or behind access doors, a suitable label and visible label shall be attached to the surface to identify the location of such items.
 - 8. Labels shall be placed around piping at least once on each pipe in rooms smaller than 15 feet.

3.3 VALVE TAGS

- A. Conduct a meeting with the Project Manager and assemble a valve tagging numbering scheme, color scheme, text size and content, method of attachment and the specific valves to be identified. Produce a digital numbering chart and a dedicated AutoCAD plan for each of (up to) ten systems to depict the location of each valve. Include on the plan a schedule indicating the text for each valve tag. Submit the chart and plans for the engineer's approval.
- B. Install valve tags in approved locations in a manner that they are readily seen. Trim chains to fit.

3.4 EQUIPMENT NAMEPLATES

- A. Nameplates shall be attached to equipment with two stainless steel sheet metal screws unless otherwise directed or approved. Attachment by adhesive has generally failed after a short period and is not normally acceptable without additional mechanical fasteners. Where it is impractical to fasten with screws, brass chains may be approved to hang nameplates with approval by the Project Manager.
- B. Name Plates shall be located so they are readily seen in a location approved by the Project Manager.

3.5 DUCTWORK IDENTIFICATION

A. Identification shall be located as identified and as directed by the Engineer.

1. On the existing/reinstalled, modified supply air duct above the cagewash unit.

END OF SECTION 22 0553

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SECTION 22 0719 - PLUMBING SYSTEMS INSULATION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Insulate all Division 23 piping, systems and equipment as specified herein.

1.2 FIRE RATINGS

- A. All products used shall be UL listed with a maximum flame spread rating of 25 and maximum smoke development rating of 50. Fire ratings shall be determined by ASTM E-84 or NFPA Standard 255. Insulation approved shall have a UL label or a certified test report from an approved testing agency.

1.3 INSTALLATION AND INSTALLER REQUIREMENTS

- A. Insulation products and methods shall comply with the 'National Commercial and Industrial Insulation Standards' as published by the Midwest Insulation Contractors Association (MICA). Installation of all insulation systems shall be accomplished by skilled mechanics with certification of successful apprenticeship program or another equivalent craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training. Validation of installer credentials is required.

1.4 SUBMITTALS

- A. Provide manufacturer's literature and ratings for all pipe and duct insulation products. Data shall include fire and smoke ratings, thermal conductivities, recommended temperature limitations, perm ratings of jackets and materials of construction. Submittals shall be clearly marked to indicate what insulation and cover is to be used, insulation thickness and which system is to be insulated with each product
- B. Provide validation/certification of the credentials for all those who will install or fabricate insulation system components. Credentials shall show compliance with the requirements of paragraph 1.3, above.

PART 2 PRODUCTS

2.1 ACCEPTABLE PRODUCTS

- A. Equivalent products of Armstrong, Johns-Manville, Knauf, Certainteed, and Owens-Corning are acceptable.
- B. Owens-Corning catalog designations and descriptions used herein.
- C. Substitute insulation shall provide same thermal and mechanical protection as the insulation specified with equivalent jacket and sealing systems.

2.2 PIPE INSULATION

- A. Pipe insulation shall be Owens-Corning Fiberglass SSL II with ASJ Max pipe insulation or equal having a thermal conductance 'k' value no greater than 0.26 at 100°F mean rating temperature, unless otherwise specifically noted herein. Insulation shall have a minimum density of 3.5 pcf and be rated for a temperature range of 0°F to 1,000°F, shall meet 2018 IECC requirements and meet ASTM C547 Mineral Fiber Insulation Type I, Grade A and Type IV, Grade B. Wall thickness shall be as listed herein for each system and pipe size. Jacket pressure rating shall exceed 90 psi and jacket permeance shall not exceed 0.01 perm. Apply field installed PVC jacket and metal jacket on all insulated piping systems noted to receive them hereinafter.
- B. Hot service water piping systems shall be covered with insulation in thicknesses as listed herein.

System/Pipe Size	1" & Under	1-1/4" – 1-1/2"	2-1/2" - 4"	5" - 6"
Domestic Hot Water**	1"	1"	1-1/2"	1-1/2"
Recirc. Hot water	1"	1"	1-1/2"	1-1/2"

** - Insulate laboratory non-potable hot water systems the same as domestic hot water systems.

- C. Steam and condensate piping shall be insulated with the materials noted above for hot water service. Steam piping insulation shall be 2" thickness for all sizes. Steam condensate insulation shall be 1 1/2" for all sizes and temperatures.

- D. Cold service piping systems shall be covered with insulation in thickness as listed herein. All interior roof drain piping concealed above the ceiling shall be insulated, including exposed portions of the drain body basin. All concealed roof drain piping, including drain bodies, shall be insulated with 2" thick insulation to help mitigate thermal bridging. Insulation thickness exposed below the ceiling shall be insulated to the thickness noted below.

System Pipe Size	1-1/4" & Under	1-1/2" to 3"	3-1/2" to 5"	6" to 10"
Domestic Cold Water**	1"	1"	1"	1"
Roof Drain Piping (exposed)	-	1"	1"	1"

** - **Insulate laboratory non-potable water the same as domestic cold water systems.**

- E. Valve Bodies, Flanges and Fittings 2" and Smaller in Size
1. Fittings shall be insulated to the thickness of adjacent insulation and covered with premolded plastic jacket, such as Zeston. Provide extra insulation at elbow head to prevent fitting cover 'oil canning'.
 2. Valve bodies 2" and under in size, flanges, and appurtenances in pipe lines and 1-1/2" in size and smaller shall be insulated with sections of molded fiberglass insulation, mudded and wrapped with a PVC jacket.
 3. Valves over 2" in size shall be insulated with removable pads as specified hereinafter.
- F. Valve Bodies, Flanges and Fittings Larger than 2" in Size and pump housings
1. Flanged valves, pressure regulators, pipe flanges and strainers shall be insulated with custom removable pads constructed of 2" thick high temperature, mechanically bonded glass fiber blanket insulation, J.P. Stevens "Insulbatte/Tempmat" style 1031 meeting MIL-I-16411 Type II requirements, sandwiched between two layers of 2025/9383 glass cloth as manufactured by J.P. Stevens. Sew or staple seams and lace in place using Bergen hooks and attach with 18-gauge soft annealed stainless- steel wire.
- G. All components in an insulated system, such as pump volutes, and heat exchangers shall be insulated.

2.3 PVC AND METAL JACKETS

- A. **Unless specifically noted otherwise, all pipe insulation below 8 feet above the finish floor shall be covered with metal jackets. Exposed insulated piping above that level (8 feet) shall be covered with PVC jacket. Jacket material shall be as listed below.**
1. Metal jackets shall be embossed 0.016" aluminum alloy by Pabco, Childers or equal with stainless steel tie bands at not more than 16" on center. Stamped fittings covers of same material. Sheet metal screws shall be 304 or 316 stainless steel.
 2. PVC jackets shall be as manufactured by Childers or Pabco and shall be 0.030" thick, with fully solvent welded joints and seams, meeting ASTM C 921, type 1, UV resistant. Pre-molded fitting covers. White in color.

2.4 HIGH DENSITY INSULATION INSERTS AT HANGERS

- A. See paragraph 3.2, below. Inserts and vapor barrier may be field or factory fabricated. In all cases, the insert shall be not less than 12" in length and the vapor barrier shall completely encompass the insert. See Section 22 0529 "Supports, Anchors and Bases" for insulation shields to be used for all piping at hangers.

PART 3 EXECUTION

3.1 GENERAL

- A. Insulation shall only be installed by trained insulating crews meeting the requirements of Part 1 of this specification section.
- B. Materials, accessories, fasteners and installation methods shall be in strict accord with manufacturer's recommendations and guide specifications, with this specification and with the MICA standards noted in Part 1 of this specification section.
- C. The appearance of the finished work will be of equal importance with its mechanical correctness for acceptance.

3.2 INSTALLATION

- A. Termination of insulation at equipment, unions, etc., shall be neat without any raw edges.

- B. Vapor barrier jackets on all cold and dual temperature pipes and ducts shall be continuous. Repair all punctures, flaps, etc., correctly and effectively.
- C. Pipe Insulation at Supports
 - 1. Install half diameter **cellular glass** insulation inserts such as Owens-Corning Foamglas at all hangers for insulated piping 1" to 4" in diameter. Install factory fabricated galvanized insulation protection shields at all hangers in accordance with Section 22 0529. Wrap insulation jacket around high density inserts. Seal jacket to weld-on saddles. Seal all joints and seams of jacket to maintain vapor barrier integrity. In lieu of field fabricated high density inserts and field installed vapor barrier jacket at inserts, provide a premanufactured system of high-density insulation with factory zero-perm PVC jacket such as 'CoolDry Saddles' by Buckaroo's Inc.
- D. Metal Jacket
 - 1. Apply with minimum 1" overlap at seams. Install panhead stainless steel sheet metal screws at a maximum spacing of 8" o.c. and stainless steel bands at not greater than 16" on center. Seams shall lay at weather/water protected side of surface, sealed with silver or clear 100% silicone sealant in direction to sheet moisture. The final appearance of the jacket shall be neat without dents or twists, and with seams straight. Ends shall be covered with metal jacketing caps and made water tight.
- E. PVC Jacket
 - 1. Apply PVC jacketing the same as metal jacket, above, using fully solvent welded joints and seams. Apply to all portions of interior pipe systems where noted hereinbefore and to their components.
- F. Existing Insulation
 - 1. Where existing piping and equipment are removed or connected to and the existing insulation is damaged, the Contractor shall repair all existing insulation and jacketing to match the new insulation.

END OF SECTION 22 0719

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SECTION 22 1100 - GENERAL REQUIREMENTS FOR PIPE AND PIPE FITTINGS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specifications Sections, apply to this Section.
- B. This Section shall also govern all piping systems installed under Section 23 1100.

1.2 WORK INCLUDED

- A. This Section governs the general installation of interior piping systems on the project. The pipe and fittings shall be as specified in each individual Section governing a specific system.

1.3 SUBMITTAL DATA

- A. See Section 22 0000 "General Provisions for Plumbing" for general submittal requirements.
- B. Provide submittal data for any material or equipment specified in this Section as listed on the Submittal Schedule (see Section 22 0000) and any special or additional data as listed hereinafter or as requested by the Project Manager.
- C. Submit documentation for all plumbers and pipe fitters verifying journeyman status for all who will oversee plumbing and piping installations. Submit master plumber validation for those who will oversee journeyman. See Section 22 0000 for qualification requirements for all pipe fitters and plumbers who will assemble piping systems on this project.
- D. Submit documentation showing current medical gas installer certification for those who will assemble laboratory air systems.
- E. Submit ASME/AWS certificates for all welders and brazers. Comply with Section 22 0000 and required qualifications stated hereinafter.

1.4 CONTRACTOR QUALIFICATIONS

- A. Qualified Personnel. Every piping and plumbing system on this project shall be installed by qualified, licensed personnel, properly trained, experienced to perform installations, and in compliance with federal regulations.
 - 1. All plumbing installations (water, drainage, and gas) shall be provided by personnel under the oversight of someone with a current U.S. (state) or jurisdictional licensure, at not less than journeyman level, with responsible master plumber oversight.
 - 2. Process piping systems shall be installed by pipefitters/process piping fitters under the oversight of someone with not less than unrestricted journeyman level, and qualified in accordance with standards of the industry or greater as required. High purity systems shall be installed by personnel appropriately trained and for such installations specific to the system type, fluid, and purity grade, and whom shall be licensed and experienced for the activity, and trained as a pipefitter.
 - 3. All welding and brazing shall be carried out by qualified welders and brazers (respectively) in accordance with ASME Code and American Welding Society (AWS) standards for the material, method, personnel qualifications, and size range utilized. Laboratory gas systems shall be assembled by pipefitters/plumbers with current ASSE series 6010 medical gas installer certification.
 - 4. Brazing and soldering procedure qualification shall conform to ASME B31.1. The brazing Procedure for joints shall be as outlined in Copper Development Association (CDA) A4015. Soldering, soldering preparation, and procedures for joints shall be in accordance with ASME B31.1 and as outlined in the CDA A4015.
 - 5. Preparation, cleaning and welding of joint piping, butt welds, fillet welds, bends, loops, and offsets, shall be in accordance with ASME B31.1. Quality of weld, correction of defects, stress relieving, and preheating shall be in accordance with ASME B31.1. Steam piping systems with operating pressures less than 20 psig and associated condensate piping may be welded in conformance to ANSI B31.9. Arc welding and gas welding shall be in accordance with ASME BPVC Section IX.
 - 6. The Owner reserves the right to provide intermittent testing of welded and brazed joints by visual or non-destructive testing. Welds or brazed joints found to fail inspection shall be cut out and re-accomplished.

7. All support contractors (system cleaners, test agencies, verifiers, cross-connection control device testers, etc.) shall be appropriately qualified in accordance with project requirements.

PART 2 PRODUCTS

2.1 GENERAL

- A. Equipment drains, relief valve drains and miscellaneous piping shall be the same as the specified system piping.
- B. Materials shall be new, clean and free of rust. Used copper piping may only be cleaned and reused for the purpose of relief valve discharge and condensate or indirect waste where appropriate.
- C. Except as otherwise specifically allowed by approved request or called for on plans, pressed fittings (aka 'Pro-Press'), push-fit (aka 'SharkBite) and pressure-lock type fittings as defined in Chapter 3 of the 2021 Uniform Plumbing Code shall not be used on this project under any circumstance.

2.2 UNIONS

- A. Steel Pipe
 1. Up through 3" - black malleable iron threaded, hexagonal nuts, ground joint (brass to iron seat), flanged unions or flanges.
 2. 3-1/2" and Up - ASME flanges, welded to pipe.
- B. Copper Pipe
 1. Up through 3" - cast brass, copper-to-copper, hexagonal nut.
 2. 3-1/2" and up - ASME cast brass flanges, soldered to pipe.
 3. See paragraph 3.2 for solder and flux materials and methods.
- C. Copper to Steel Pipe or Stainless Steel Pipe
 1. Up through 2" - Install a union within one material or the other but not at the junction of the two. Join the two different materials with a polypropylene lined schedule 40 galvanized steel dielectric nipple rated for 300 psi from -40F to 300F, threaded ends, similar and equal to Anvil 9090.
 2. 2-1/2" and up - cast brass flange soldered to copper pipe and steel or iron flange welded to steel pipe.
- D. Plastic (PVC) to Steel
 1. 150# plastic flange with solvent weld hub to standard ASME steel flange.

2.3 REDUCERS

- A. Copper or steel, flanged, threaded, or welded, eccentric or concentric as required, to match fittings specified for different piping systems.

2.4 STRAINERS

- A. Copper or steel, flanged, threaded or soldered, "Y" type, with Monel metal screens as required to match type of fitting specified for different piping systems. Special strainers shall be as noted on the drawings.
- B. The screen area shall be a minimum of three times the area of the inlet pipe.

2.5 CONNECTIONS BETWEEN DIFFERENT MATERIALS

- A. Dielectric Protection
 1. Dissimilar metals within the same piping system shall be minimized. Dielectric protection shall be provided between dissimilar metals including between galvanized steel and stainless steel, ductile iron and copper or stainless steel, as well as between copper and stainless steel that is not assuredly maintained in the passive state or where the predominant material (by wetted surface area) is stainless. Dielectric protection may be avoided only in low corrosion risk applications where the wetted surface area of the cathodic material is sufficiently small relative to the anodic material. Dielectric protection shall be as follows:
 - a. Dielectric unions should be avoided and are acceptable only where specifically noted on plans or otherwise approved by the Project Manager. Manufactured dielectric waterways with high temperature polypropylene or PVDF liners shall, similar and equal to Anvil figure 7090 or Elster Perfection's "Clear Flow" shall be used wherever possible. Dielectric waterways shall maintain metallic continuity of the piping system while providing a dielectric break in the fluid and shall meet the requirements of ASTM 1545 for continuous use at temperatures up to 225°F and pressures up to 300 psig. Waterways shall be IAPMO/UPC listed.
 - b. Dielectric flange kits complete with bolt isolation sleeves shall be provided for flange transitions between dissimilar metals.

- c. The use of brass or bronze valves, fittings, or piping shall not serve as approved dielectric protection between dissimilar metals.
- d. The dielectric fitting shall be installed directly to the anodic material without any intervening brass fittings between the anodic material and the dielectric isolator.

2.6 DRAIN VALVES AND BLOWDOWN VALVES

- A. Unless otherwise noted on plans, all drain valves and blowdown valves shall be factory made ball valves with integral hose threads and metal cap with chain, similar and equal to Nibco model T-585-70-HC or Conbraco model 78-1xx-01. Valves shall be rated 600 psi CWP and meet MSS SP-110. Hose threads shall comply with ANSI B1.20.1. **Valves connected to domestic water piping or non-potable water piping derived from potable water piping, shall be fit with an ASSE 1001 low lead hose connection vacuum breaker backflow preventer similar and equal to Watts model LF8.**

PART 3 EXECUTION

3.1 GENERAL

- A. Install generally where and as shown on drawings. Coordinate installation of piping with other trades. Modifications to and new additions to existing piping systems shall match materials and methods used in existing systems.
- B. Piping shall be arranged to avoid conflict with ducts, light fixtures, etc., and to provide adequate room for personnel passage and maintenance of pipe and equipment.
- C. Provide for expansion and contraction. Anchor pipe where shown or as necessary for proper distribution of expansion stresses.
- D. Piping requiring insulation shall be run so that adequate clearance is maintained to permit proper insulation. Any piping installed without this clearance must be removed and reinstalled at the Contractor's expense to enable insulation to be applied.
- E. Provisions shall be made in piping for the installing and use of wells for gauges, etc. by this Contractor.
 - 1. On 2-1/2" and smaller pipe, increase pipe size at well so there will be no restriction to flow.

3.2 JOINTS

- A. Ream pipe to full inside diameter after cutting. Scale, rust and foreign matter shall be removed before assembly. Note: The Project Manager reserves the right to request a minimum of one (1) pipe joint may be cut out of each system at the Owner's or Engineer's discretion to inspect for proper reaming. The piping will be reassembled by the contractor at no increase of contract cost. If improper reaming is detected, the entire piping system will be rejected.
- B. Soldered Copper
 - 1. See Parts 1 and 2 of this specification and Section 22 1116 "Domestic Water Piping System".
 - 2. The same products shall be used throughout the project for all systems. Products used shall be specifically recommended by the manufacturer for potable water as well as for HVAC hydronic systems operating up to 250° F at 125 psig or higher.
- C. Threaded Steel
 - 1. Full, clean threads. Joints made up with an approved compound or Teflon tape applied to male thread.
- D. Welded Joints
 - 1. Welding fittings shall be Bonney Forge line of butt weld fittings or as approved. Socket type fittings shall be used on small pipe.
 - 2. Mitering of pipe for changes in direction not permitted. Branches shall be taken off using welding tees, not by notching or burning hole in main. Weld-O-Lets may be utilized for gauge connections and other small connections where approved by the Engineer but shall not be used for branch piping connection unless specifically approved by the Project Manager on a case-by-case basis.
 - 3. All welds shall be cleaned and given one coat of black, rust-inhibiting paint.
 - 4. Welding shall be done by an ASME/AWS certified welder holding a current certificate. See Part I of this section.
- E. Copper Tube Extracted Joint
 - 1. Joint shall be produced with an appropriate tool by drilling a pilot hole and drawing out the tube surface to form a collar having a minimum height of three times the thickness of the tube wall. To prevent the branch tube from being inserted beyond the depth of the extracted joint, dimpled

- depth stops shall be provided. Branch tube shall be notched for proper penetration into fitting to assure a free flow joint.
2. Extracted joints shall be brazed in accordance with the NAPHCC/ASPE National Standard Plumbing Code. Soldered joints will not be permitted.
- F. Victaulic (grooved) Systems shall be utilized only where allowed by individual sections of this specification. In all cases:
1. Couplings shall be Style 07, 75 or 77 for grooved end pipe.
 2. Fittings to be grooved end to accept style of coupling used.
 3. Flanges to be Vic-Flange Style 741/742.
 4. Gaskets to be Grade E (EDPM) for continuous temperatures up to 230 degrees Fahrenheit.
 5. Couplings in machine rooms at valve connections and equipment hook-ups to be rigid type.
- G. Plastic - as recommended by the manufacturer for the class of service.
- H. Any flanged fittings on copper pipe shall be joined to piping using a standard brass flange with copper end. A flange screwed to a sweat adapter will not be acceptable.

3.3 UNIONS

- A. Unions to be installed to facilitate the removal of any piece of equipment without having to cut any pipe.
- B. Piping shall be offset and provided with unions, flanges or Victaulic couplings where connected to equipment containing pumps, tanks, coils or tube bundles. Pipes shall be connected in such a manner so as to permit the removal of pumps, heads, coils, etc., with a minimum amount of disturbance to the piping system.
- C. Use insulating waterway or flanges for joining dissimilar metals.

3.4 REDUCERS

- A. Pipe size changes on following listed systems to be made with reducers.
 1. Water Systems - eccentric type on horizontal runs with straight side on top, and concentric type in vertical pipe. Steam and condensate system reducers shall be installed with the straight side on the bottom in horizontal piping. Concentric reducers shall be used in vertical steam and condensate piping.

3.5 STRAINERS

- A. Strainers shall be installed so that there is adequate clearance for the removal and cleaning of the screen.
- B. Blowdown valves shall be ball valves with integral hose thread and cap as specified above for water and air systems. Valves shall meet the requirements of Section 22 0523 "Valves".
- C. When indicated on plans for blowdown to be piped to the floor or to a floor drain install a full port blowdown ball valve at the strainer.
- D. When indicated on plans for blowdown to be piped to the floor or to a floor drain install a full port blowdown ball valve at the strainer.

END OF SECTION 22 1100

SECTION 22 1116 - DOMESTIC WATER PIPING SYSTEM

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 WORK INCLUDED

- A. This section governs the materials and installation of the domestic hot and cold water systems and for laboratory (aka "industrial" or "non-potable") water systems. Piping and methods shall be the same for potable (domestic) and non-potable (identified as industrial or laboratory) piping systems.
- B. Work of this Section includes testing, recording and reporting performance/certification of all new backflow preventers installed on the project.

1.3 SUBMITTAL DATA

- A. See Section 22 0000 "General Provisions for Plumbing" for general submittal requirements.
- B. Provide submittal data for any materials or equipment specified in this Section as listed on the Submittal Schedule (see Section 22 0000) and any special or additional data as requested by the Project Manager.
- C. Submit complete manufacturer's literature, O&M Manuals and installation instructions for backflow preventers, shock arrestors, dielectric waterways, gauges and other equipment specified in this section. Submit proof of piping quality controls and standards and complete information on flux, solder and brazing materials to be utilized.
- D. At project completion submit a complete schedule and log booklet containing data for every testable and non-testable backflow preventer installed on the project. Data shall include make, model and size of each device plus identify the location and system served. The log shall include a field testing certificate for each device that is testable.
- E. Submit a plan for flushing, cleaning and disinfection of the piping systems.
- F. Submit certified lab test results for water quality at completion of the cleaning and disinfection process as required in Paragraph 3.1.

1.4 BACKFLOW PREVENTION

- A. Provide anti-siphon and backflow prevention devices where shown and scheduled on the drawings and on any equipment capable of backflow into the domestic water system. This includes faucets with hose threads and equipment with any supply pipe opening below the water line of the fixture. The installing contractor shall provide qualified personnel to test every testable device installed prior to project completion and to furnish satisfactory test reports.

PART 2 PRODUCTS

2.1 PIPING

- A. Cold and Hot Water Pipe
 - 1. Piping shall be hard temper seamless copper tube, ASTM B88, hard drawn. Manufacturer shall be ISO 9001 (or equivalent) and ISO 14001 or equivalent certified. Wall thickness shall be Type L.
- B. Fittings for Copper Pipe
 - 1. Fittings shall be of wrought copper solder cup type, ANSI/ASME B16.22 or B16.18. Manufacturer to be ISO 9001 (or equivalent) and ISO 14001 or equivalent certified.
- C. Copper Joint Assembly
 - 1. Copper joint assemblies for piping less than 3" shall be ASTM B828 lead-free, soldered joints with ASTM B32 Grade HB, Grade NH, or, approved equal solder that is also listed in Section 1 of ASTM B32. ASTM B813 high temperature water soluble flux. Air cooled only, no quenching. System shall be rinsed thoroughly as soon as possible after soldering to prevent on-going flux activity. External surface flux residue shall also be removed.
 - 2. Copper joint assemblies 3" and up shall be BCuP3, 4, or 5 brazed joints per Section IX ASME BPVC or ANSI/AWS B2.2. High silver soft soldering (alloys that melt below 449oC (849oF) in lieu of brazing is not acceptable. No flux permitted for copper-to-copper joints. AWS A5.8 Bag-5 may also be used for copper to brass or bronze. Flux for copper to brass or bronze should be AWS A5.31 Class FB3-A or FB3-C. Lead free copper alloy fittings and valves (including cast) that

- contain a component that melts below 327°C (620°F), bismuth, or over 15% zinc shall not be brazed. BCuP 9 or BAg-5 shall be used for threaded copper adapters to prevent annealing.
- D. Valves shall be as specified in Section 22 0523 “Valves” or as specifically noted on plans.
 - E. System Disinfection and Elastomers
 - 1. Components and elastomers of potable and lab distribution systems shall be suitable for hot water sanitization at temperatures of up to 80°C (180°F), as well as for chemical sanitization with chlorine (or for entirely stainless steel systems with no copper or brass components, hydrogen peroxide/peracetic acid) solutions. Elastomers shall be of suitable inert materials, and shall not be constructed of natural rubber. Elastomers shall comply with plumbing code and be listed in accordance with NSF-61 or 21 CFR 177.2600 provisions. NSF-61 commercial hot classification is required for components for hot water systems.
 - F. Dielectric Protection
 - 1. Dissimilar metals within the same piping system shall be minimized. Dielectric protection shall be provided between dissimilar metals including between galvanized steel and stainless steel, ductile iron and copper or stainless steel, as well as between copper and stainless steel that is not assuredly maintained in the passive state or where the predominant material (by wetted surface area) is stainless. Dielectric protection may be avoided only in low corrosion risk applications where the wetted surface area of the cathodic material is sufficiently small relative to the anodic material. Dielectric protection shall be as follows:
 - a. Dielectric unions shall be avoided and are acceptable only where specifically noted on plans or otherwise approved by the Project Manager. Manufactured dielectric waterways with high temperature polypropylene or PVDF liners shall, similar and equal to Elster Perfection’s “Clear Flow” shall be used wherever possible. Dielectric waterways shall maintain metallic continuity of the piping system while providing a dielectric break in the fluid and shall meet the requirements of ASTM 1545 for continuous use at temperatures up to 225°F and pressures up to 300 psig. Waterways shall be IAPMO/UPC listed.
 - b. Dielectric flange kits complete with bolt isolation sleeves shall be provided for flange transitions between dissimilar metals.
 - c. The use of brass or bronze valves, fittings, or piping shall not serve as approved dielectric protection between dissimilar metals.
 - d. The dielectric fitting shall be installed directly to the anodic material without any intervening brass fittings between the anodic material and the dielectric isolator.

2.2 SHOCK ARRESTORS

- A. Size as noted on the drawings. If no size is listed on plans, use sizing as recommended by the Plumbing and Drainage Institute (PDI). Arrestors shall be J.R. Smith Hydrotrol Junior 5200 series copper arresting chamber, poly piston and o-rings, and male IPS threaded inlet. Unit shall have a 350 psi maximum working pressure, 33°F-250°F working temperature range, and comply with the following specifications: PDI WH-201, and ASSE 1010.2.6.

2.3 GAUGES

- A. Equivalent products of Trerice, U.S. Gauge, Palmer, Marshalltown and Marsh are acceptable.
- B. Pressure Gauges
 - 1. Trerice #700LFB, liquid filled, 4" dial, 304 stainless steel case and ring, brass movement, black pointer on white aluminum face, 0-100 psig range, complete with #865-PBF gauge cock and number 872-PBF snubber. Accuracy 1% of full scale, ASME B40.100 Grade 1A. Gauge and accessories shall be compliant with ANSI/NSF 372 and 61.
- C. Temperature Gauges
 - 1. Trerice No. SX91403 or approved equal light-powered digital thermometer with 7" cast aluminum case, adjustable stem, digital display with 9/16" high characters, minimum/maximum display, and -40°F to 300°F range, accurate to within plus or minus 1°F and requiring only 10 Lux of light to operate. Provide with optional NSF 61 compliant brass thermo-well and heat transfer paste.

PART 3 EXECUTION

3.1 PIPE

- A. Slope all piping for proper air relief and drainage.
- B. Make adequate provisions for pipe expansion. Anchor, block and brace pipe to prevent movement from water surges and hammer.

- C. **Install shock arrestors on supplies to fixtures with quick closing valves and with solenoid valves. Install shock arrestors on every cagewash equipment supply as near the cagewash connection as possible.** Arrestors shall be sized in accordance with PDI recommendations.
- D. **Cleaning and Disinfection**
1. Prior to use, the entire system (both lab and domestic, hot and cold) shall be thoroughly flushed, adjusted, commissioned, and disinfected with approved materials compatible with piping system materials, and delivered water quality tested by qualified labs. Flushing of outlets is required to occur at each point of use to clear all contaminants, and shall be performed thoroughly prior to any disinfection. Upon completion of flushing and testing, the system shall be maintained in operational status with residual disinfectant and periodic flushing at not to exceed 3-day intervals, or drained and dried (and then disinfected and put into use when ready).
 2. Chemical disinfection procedures shall occur only after notification and approval of the Project Manager. Chemicals to be used shall be verified compatible with all system materials. Chlorine use in disinfection of stainless-steel systems shall be limited to 50 ppm for 24 hours. Peracetic acid/hydro-gen peroxide is preferred for stainless systems but is not acceptable for systems containing any copper or brass components.
 - a. The disinfection and sampling process shall be performed in a controlled manner by qualified contractors with appropriate safeguards to protect facility and occupants from hazards.
 - b. Chemicals shall be utilized at required concentrations throughout the system, but for the minimal time required to achieve effective results, and shall then be immediately flushed from the system within the same day upon achieving required contact duration. Chemicals shall be listed for use in potable water systems and shall be compatible with system materials.
 - c. The disinfection process shall be fully supervised for the entire duration. Disinfectant residual levels shall not be used to determine need for re-application of disinfection. Repeated procedures shall be based on test results so as not to damage piping.
 - d. Prior to sampling and as soon as possible after achieving required contact time, the disinfectant shall be thoroughly flushed from the system with potable water flowing at each outlet to achieve background water supply disinfectant residual levels throughout.
 3. All components, controls, devices, and alarms shall be calibrated and individually verified for proper operation and adjustment, including but not limited to flow, pressure and temperature. Systems shall be fully commissioned including all critical parameters, proper response to power-loss scenarios, failure conditions, monitoring and alerts, including integrated systems testing. Verification of adequate flow, temperature, and pressures and proper adjustment of the new cagewash equipment shall be conducted.
- E. **Testing**
1. Test piping system before connecting to existing systems, before applying insulation and before concealing.
 2. Items not designed to take test pressures must be isolated from the line during testing.
 3. Test the system by applying a hydrostatic pressure of 125 psi held for 4 hours without any drop in pressure or other indication of leakage.
 4. Leaks shall be repaired and the test repeated until all systems prove tight.
 5. Test and certify all new backflow preventers and submit test report to the Project Manager.

END OF SECTION 22 1116

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SECTION 22 1316 - SOIL, WASTE AND DRAIN PIPING SYSTEMS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Follow Division 31 of these specifications for trenching and backfill.

1.2 WORK INCLUDED

- A. This Section governs the sanitary drain, waste and vent piping system and roof drainage system piping within the building.

1.3 CODE COMPLIANCE

- A. The work shall be in accordance with the requirements of the 2021 Uniform Plumbing Code with all State and Local Amendments.
- B. Where more stringent requirements are specified herein, then the work shall comply with the specified requirements.

1.4 SUBMITTAL DATA

- A. See Section 22 0000 "General Provisions for Plumbing" for general submittal requirements.
- B. Provide manufacturer's literature for all products specified in this Section which will be installed under this project.

PART 2 PRODUCTS

2.1 SANITARY SEWER SYSTEM AND ROOF DRAIN SYSTEM PIPING

- A. Underground Piping
 - 1. Underground piping is not anticipated. However, if underground piping becomes necessary for any reason, buried piping under the building shall be Service Weight (SV) cast iron soil pipe with bell and spigot fittings or hubless pipe and fittings.
 - 2. Bell and spigot piping and fittings shall conform to ASTM A74 and CISPI HS74-86. Gaskets and seals shall conform to ASTM C 564 and CISPI HSN 85.
 - 3. Hubless pipe and fittings shall conform to ASTM A 888 and CISPI 301. Coupling shall be shielded type, heavy duty 304 stainless steel with not less than 4 band clamps conforming to ASTM C 1277-04 ASTM-1540 and CISPI 310-04, Husky model SD4000 or approved equal.
- B. Aboveground Piping
 - 1. Non-buried piping and piping above floor slab shall be hubless cast iron soil pipe, with fittings and couplings as noted in Paragraph 2.1. A above.
- C. Where not subject to hot water from boiler or equipment drains, above-ground and below-ground waste and vent piping may also be constructed of schedule 40 DWV PVC piping with solvent welded fittings in conformance with all code requirements. Roof drain piping shall be cast iron only.

2.2 PUMPED WASTE

- A. ASTM B88 seamless copper tube, Type L, with soldered DWV fittings.

2.3 CLEANOUTS

- A. Equivalent products of Zurn, J.R., Smith, Wade and Josam are acceptable.
- B. Cleanouts on bare pipe - Zurn No. Z-1440.
- C. Cleanouts in floor - Zurn No. Z-1400-2 combination cleanout and nickel bronze frame and scoriated cover, adjustable.
- D. Cleanouts in wall - Zurn No. Z-1440-1.

2.4 INDIRECT WASTE PIPING

- A. Any indirect waste piping shall be type L copper or schedule 40 grade 304 or 316 stainless steel. All drain lines from the cagewasher shall be constructed of these materials.

PART 3 EXECUTION

3.1 PIPING

- A. Soil Pipe Joints
 - 1. Joints in cast iron soil pipe and fittings without hubs shall be made using a heavy duty mechanical compression-type coupling consisting of a neoprene collar, stainless steel band with transverse corrugations and four (minimum) stainless steel clamps with stainless steel setscrews all assembled to provide a positive seal, and shall conform to Standard 310 of the Cast Iron Soil Pipe Institute.
 - 2. Joints in bell and spigot cast iron soil pipe and fittings shall have a double-seal, compression-type molded neoprene gasket and shall be provided with a modified hub as required to provide a positive seal. Provide thrust restraint for all bell and spigot piping.
- B. Joints for steel and copper to be in accord with Section 22 1100 "General Requirements for Pipe and Pipe Fittings".

3.2 INSTALLATION

- A. Slope waste piping not less than 1/4" per foot.
- B. Changes in direction shall be made with appropriate fittings. Long bends shall be used where possible.
- C. Plumbing System Vents
 - 1. All fixtures shall be vented.
 - 2. Horizontal vents shall be sloped up not less than 1/16" per foot. Increase vent size as required by code for extended horizontal runs.
 - 3. Extend vents to 12" above roof.
 - 4. Increase vents to minimum of 3" diameter before going through roof.
- D. Cleanouts
 - 1. Adjust covers and frames to be flush with finished floor.
 - 2. Install where indicated and as required by governing codes.
- E. Trenching and Backfill
 - 1. Trenches for pipe to be excavated at least 4" below pipe. Fill bottom of trench with clean crushed gravel or sand. Scoop out for bells so pipe is supported entire length. After testing, fill side voids and up 4" over pipe with backfill Type 1 as specified in Division 31. Follow pipe manufacturer's instructions for backfill and compaction in all cases.
 - 2. Remainder of backfill and compaction shall be in accordance with Division 31 requirements.

3.3 TESTING

- A. General
 - 1. Piping shall be tested before it is covered up or built-in. Leaks to be repaired and test repeated until system is approved.
 - 2. Any damage occurring as result of testing, leaks, etc., shall be corrected at this Contractor's expense.
 - 3. Notify the Commissioning Agent and Project Officer not less than ten working days in advance of any testing. Submit a testing plan indicating how and when each section of piping is to undergo initial and final testing.
- B. Drainage Systems Initial Testing Prior to Backfill or Insulation
 - 1. Sanitary sewer drain and vent piping within building, including roof drain and roof drain overflow systems: Fill with water up at least 10 feet. Inspection shall be maintained for a period not less than four hours. There shall be no visible leaks or drop in water level.
- C. Submit complete test reports for approval following successful testing.

END OF SECTION 22 1316

SECTION 22 6313 - COMPRESSED AIR PIPING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 WORK INCLUDED

- A. Work under this Section includes furnishing, installing and testing laboratory compressed air piping systems as indicated on the drawings. Systems specified herein include piping, fittings, line valve as well as other components noted below and/or shown on the plans. All materials and methods, including installer qualifications, shall meet the requirements of NPFA 99, 2018 Edition, Chapter 5 for Type 1 medical gas systems. Testing in accordance with the NFPA 99 reference listed above is not intended. Piping systems include:
 - 1. Compressed Air – alteration to existing piping

1.4 SUBMITTALS

- A. Product Data: For the following:
 - 1. Installer and Brazer Qualifications.
 - 2. Piping, joints, fittings including verification of compliance with all qualifications noted in Part 2 of this specification.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store air piping and specialties in containers, and piping with end protection.
- B. Store pre-cleaned and sealed pipe, fittings, valves and specialties with sealing plugs and sealing packaging intact.
- C. Store all materials indoors or in weather protected containers conditioned to maintain temperatures between 50°F and 105°F.

1.6 CODE AND STANDARD COMPLIANCE

- A. Materials and assembly methods for all piping shall be in compliance with 2018 NFPA 99 Chapter 5 paragraph 5.1 for Category 1 Piped Gas and Vacuum Systems and subject to the requirements and limitations stated herein.

1.7 ADDITIONAL CODE COMPLIANCE AND QUALITY ASSURANCE

- A. All piping equipment, installation and testing shall conform to the latest editions (including changes and revisions) of the following Codes and Standards:
 - 1. NFPA 99 Health Care Facility.
 - 2. ASTM B819 Standard Specification for Seamless Copper Tube for Medical Gas Systems.
 - 3. AWS A5.8 Brazing Filler Metal.
- B. Comply with Federal, State and Local Codes applicable to this installation including NFPA 99C.

1.8 TESTING

- A. Testing shall be in accordance with Part 3 of this Section.

1.9 QUALIFICATIONS FOR THOSE WHO ASSEMBLE PIPING

- A. Follow Section 22 1100 "General Requirements for Pipe And Pipe Fittings".

PART 2 PRODUCTS

2.1 SYSTEM INTEGRITY, QUALITY, AND CLEANLINESS FOR COMPRESSED AIR AND GAS SYSTEMS

- A. Compressed air systems shall be designed and installed in conformance with the CGA guidelines.
 - 1. Brazing criteria of general lab gases shall meet Section IX, ASME Boiler and Pressure Vessel Code or ANSI/AWS B2.2 Standard for Brazing Procedure & Performance Qualifications, both as modified by NFPA-99 or the Copper Development Association for medical gas application. A purge gas flow meter and O2 analyzer is required for all brazing.
 - 2. Valves and all other fluid contact components shall be clean for oxygen service, to at least the required standards of the system.

2.2 PIPES AND TUBES

- A. ASTM B819 copper tube, cleaned and degreased for oxygen service by the piping manufacturer; Type L hard, factory nitrogen charged and ends capped. Any piping contaminated or not under nitrogen charge at time of installation not accepted. Manufacturer to be ISO 9001 (or equivalent) and ISO 14001 or equivalent certified.

2.3 PIPE AND TUBE FITTINGS

- A. Wrought copper solder cup type fittings, ANSI/ASME B16.22, factory cleaned and degreased for oxygen service by the fitting manufacturer in accordance with ASTM G93 Level C or better, as well as CGA G4.1 and NFPA-99. Factory nitrogen charged and bagged maximum 20 fittings per bag. Manufacturer to be ISO 9001 (or equivalent) and ISO 14001 or equivalent certified.

2.4 JOINING MATERIALS

- A. Pipe joints shall be assembled by BCuP 3, 4, or 5 brazed joints without flux following not less than NFPA 99 Level 1 system standards and ASSE series 6000 installation procedure, including clean, dry filtered nitrogen (or argon) purge, oxygen analyzer, purge gas flow meter, and compliance with Section IX ASME BPVC or ANSI/AWS B2.2 (as modified per NFPA-99). A high quality particle filter shall be provided for purge gas. The use of a cryogenic source of purge gas is recommended, but in no case may purge gas be less than NF grade. Lead free copper alloy fittings and valves (including cast) that contain a component that melts below 327°C (620°F), bismuth, or over 15% zinc shall not be brazed. BCuP 9 shall be used for threaded copper adapters to prevent annealing.

2.5 SHUT-OFF VALVES

- A. Valves shall be bronze body, double seal, full port, union ball-type with teflon (TFE) seats and Viton seals, "O" ring packing, bronze ball which seals in both directions, blow-out proof stem, having a pressure rating of 4137 kPa (600 psig). Provide products by one of the following or as approved:
 - 1. Amico
 - 2. Concoa
 - 3. Ohio Medical
 - 4. Nibco
 - 5. Conbraco
 - 6. Squire Cogswell
 - 7. Allied Healthcare
 - 8. Beacon Madaes
- B. Valves shall be operated by a lever handle requiring only a quarter turn from a fully open position to a fully closed position. All valves shall be equipped with washed and degreased copper pipe stub extensions at both the inlet and outlet sides of the valve port to facilitate installation. Pipe stubs shall include 1/8" NPT brazed gauge fittings upstream and downstream of the valve to allow placement of gauges and/or pressure transducers. Valve operators shall be of a lockable type.
- C. Valves shall be designed so that it can be "swung-out" during installation to prevent damage due to heat transfer during the brazing operation. A UL listed label showing the appropriate gas services and pressure rating shall be attached to each valve.
- D. Each valve assembly shall be provided washed and degreased for medical gas service and pipe stub extensions shall be capped at both ends. The valve shall be supplied in a sealed plastic bag to prevent contamination prior to installation.

PART 3 INSTALLATION

3.1 PREPARATION

- A. Cleaning: Use only factory-pre-cleaned and -capped piping and fittings. Field cleaning is not acceptable.
- B. Protect cleaned piping before and during, and after installation.

3.2 PIPING APPLICATIONS

- A. All Laboratory Gas and Vacuum Piping: Pre-cleaned, copper tube with pre-cleaned, wrought-copper fittings and brazed joints. Follow the requirements for materials, assembly and qualifications noted in Part 2 of this Section and in Section 22 1100 "General Requirements for Pipe and Pipe Fittings".

3.3 PIPING INSTALLATION

- A. Install piping next to equipment, accessories and specialties to allow service and maintenance.
- B. Transition and special fittings to allow service and maintenance.
- C. Flanges may be used on above-ground piping, unless otherwise indicated.
- D. Install supports and anchors according to Division 22 Section 22 0529 "Supports, Anchors, Bases".
- E. Valves Applications: Use ball valves specified in this Section for main shut-off, branch and equipment isolation, source isolation and zone valve duties.
- F. Purge laboratory gas piping using oil-free, dry nitrogen after installing piping but before connecting to service-outlet valves.

3.4 CONNECTIONS

- A. Connect laboratory gas piping to equipment, accessories, and specialties with unions. Install with isolation ball valve at all branch lines.

3.5 LABELING AND IDENTIFICATION

- A. Install labeling on piping, valves, valve-box covers, air manifolds, and alarm panels according to Division 22, Section 22 0553 "Piping and Equipment Identification. "

3.6 TESTING, QUALIFICATION, SYSTEM VERIFICATION, AND CLEANLINESS PROCEDURES

- A. Prior to operation, gas systems shall be pressure tested to at least 150% design operating pressure using inert gas of cleanliness and purity not less than the design process fluid. Systems shall be leak tight after the temperature stabilization period for a minimum of 8 hours. Test and purge gas from portable sources shall be Grade 4 or better argon, nitrogen, or equal for the application.

END OF SECTION 22 6313

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DIVISION 23 - MECHANICAL

SECTION 23 0000 - GENERAL PROVISIONS FOR MECHANICAL WORK

PART 1 GENERAL

1.1 SCOPE

- A. The scope of mechanical work for this project includes all work depicted on the mechanical and plumbing plans and the work specified in Divisions 22 and 23. The work includes installation of all new work associated with the renovation and modification and extension of existing piping systems and utilities. Other building areas of the facility that may be affected by work of this project will remain occupied and functional throughout the construction period. It is imperative, without exception, that any and all outages to all systems are prior approved by the Project Manager in advance.
- B. See Section 22 0000, paragraph 1.2 for required contractor qualifications for all trades.

1.2 BIDDING

- A. The Contractor shall provide labor, materials, equipment, items, articles, operations and methods listed, shown, scheduled, or mentioned on the drawings, and/or specified, including all incidentals required for their completion.
- B. The Contractor shall refer to the General part of these specifications, such as Instructions to Bidders, Special Conditions and Division 01 for restrictions covering time that work can be performed in certain areas, noisy and dusty operations, sequence of work, access to restricted areas and similar types of work and operations.
- C. Take cognizance of any change required in this work which may be a direct result of any alternate bid item listed and include the price deemed necessary to meet the requirements of the respective alternate.

1.3 SUBSTITUTIONS

- A. Items in this Division are generally eligible for substitution in accordance with the General Conditions and Supplements thereto. Where a proprietary specification is written for a particular item, then only that item may be used.
- B. When the Project Manager deems it necessary, to assure satisfactory installation and compatibility with other equipment, piping, ductwork, electrical provisions and other appurtenances, the Contractor shall prepare scale drawings of the substitute item showing proposed location, connections, relation to other equipment and other pertinent data such as maintenance space requirements, electrical requirements, height and weight. Drawings must receive Project Manager's approval before the substitution is made.
- C. It is the Contractor's responsibility that the substitute item shall fit into the space allocated and that the item can be installed and function as intended. Should changes in the work of any Contractor become necessary as a result of any substitute item under this Division, such changes shall be arranged and paid for by this Contractor.
- D. Capacities of substitute items shall not be less than that of the specified item.
- E. The performance of the factory representative and supplier on past work will be a consideration in the approval process of substitute items.
- F. The final decision as to acceptability rests with the Project Manager.

1.4 CODES, REGULATIONS AND PERMITS

- A. All materials and equipment shall be new, approved by the governing authority, and be in new, undamaged condition when installed.
- B. Comply with the current edition as of the bid date of the International Mechanical Code, National Fire Protection Association Codes and Standards, Uniform Plumbing Code, International Building Code, and all other applicable Federal, State, County and City codes, regulations and ordinances. Comply with DIVISION 26 and all codes referenced therein for any and all electrical work accomplished under this Division or by this Contractor.
- C. Arrange for and obtain all permits and approvals required for the execution of the work.

1.5 INTENT OF DRAWINGS

- A. Pipe or duct risers and other diagrams are schematic only and not to scale. They are intended only to indicate sizes or relative arrangement of pipe and equipment shown elsewhere in plan view.

1.6 WORKMANSHIP

- A. Work shall be accomplished by workmen skilled in the particular trade, in conformance with best practices and to meet all applicable codes.
- B. This Contractor shall replace materials or equipment not properly installed or finished, without increase in payment received.
- C. See Sections 22 0000 and 23 1100 for qualifications of individuals performing specific operations. Additional qualification requirements may also be stated in individual Sections of this Division.

1.7 RESPONSIBILITY

- A. The Contractor is responsible for installation of a satisfactory and complete piece of work in accordance with true intent of the drawings and specifications.
- B. Consult all drawings for the project to predetermine that the work and equipment will fit as planned. Provide all information and services, as required, for completion of coordination drawings as may be specified in Division 1 or elsewhere in these specifications.
- C. The location of piping, ducts, equipment, etc., shall be checked to ensure clearance from openings, structural members, cabinets, lights, outlets, and equipment having fixed locations. This shall be accomplished prior to fabrication of pipe or ducts.
- D. If, at any time, and in any case, changes in location of piping, ducts, equipment, etc., becomes necessary due to existing obstacles or installation of other trades shown on any of the project drawings and such conflict could have been avoided by proper coordination between trades or proper pre-planning of work, such required changes shall be made by the Contractor at no extra cost. These changes are to be recorded on the record drawings.
- E. This Contractor is responsible to provide all incidental electrical interconnections, control wiring, etc., which are necessary for system completion and which are not specifically shown or otherwise indicated on the electrical drawings or specified in DIVISION 26.
- F. All electrical work incidental to or accomplished under this Division shall comply with all requirements of DIVISION 26.
- G. Contractor shall provide to the owner copies of Bill of Materials, invoices, and approved shop drawings for VFD's, motors, and other equipment required for use to apply for energy rebate programs.

1.8 DELIVERY AND STORAGE OF MATERIALS

- A. Make provisions which are acceptable to the Project Manager for delivery and storage of materials.
- B. Make provisions for introduction into the building of equipment furnished under this Division.
- C. Refer to DIVISION 1 for additional provisions to allow equipment passage into the building.
- D. The contractor shall install only new equipment and materials. The contractor shall protect all stored materials from weather, sunlight, dirt ingress and damage. Weathered, rusted or damaged materials shall not be installed and shall be removed from the project site.

1.9 MANUFACTURER'S DIRECTIONS

- A. Manufactured materials and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned as directed by the manufacturer unless noted otherwise herein or on the drawings.
- B. Certain items of equipment, as noted herein, shall be checked out, started and put into service by factory representatives.

1.10 CUTTING, PATCHING, REPAIRING

- A. Cutting, patching and repairing required by the work of this Division shall be the responsibility of this Contractor.
- B. Work shall be performed in accordance with DIVISION 1 of these specifications.
- C. The performance of this work shall not weaken the structural integrity of the building.
- D. Any abrasion or disfigurement of the finished work or any portion of the building where any such abrasion or disfigurement is caused by the activities of the Contractor shall be repaired and neatly refinished to match the adjacent work.

1.11 OPENINGS IN PIPES AND DUCTS

- A. Openings in pipes and ducts shall be kept closed during progress of work.
- B. The Contractor is required to clean new systems found dirty to the satisfaction of the Project Manager at no additional cost.

1.12 CLEANUP

- A. Upon completion of work daily, remove materials, scraps, etc., relative to this work and leave the premises in a clean and orderly condition. This applies equally to finished, unfinished and concealed spaces.
- B. Clean equipment of dirt and debris.

1.13 SAMPLES

- A. The Contractor shall submit actual production samples on any material or equipment requested if, in the Project Manager's opinion, it is necessary in order to determine the quality, workmanship, operation, etc. of the item.
- B. Samples will be returned to the Contractor. Approved samples may be used on the job.
- C. Costs incurred in providing and returning samples will be the responsibility of the Contractor.

1.14 TEMPORARY SERVICES

- A. See Division 01 General Requirements for Temporary Facilities.

1.15 FIRE PROTECTION

- A. Metallic pipe, duct and other penetrations of all fire partitions, walls and floors shall be effectively fire-stopped to equal the fire rating of the floor or partition using materials and methods UL approved and tested to meet all conditions of ASTM E119, UL 1479 and ASTM E 814 tests. Firestopping materials shall carry a UL 'W' rating of Class 1 for water leakage. One such product line is 3M Fire Barrier Watertight Sealant 1003SL (self leveling) or 1003NS (non-slump). Other acceptable materials by Dow Corning, General Electric and other qualified manufacturers are not prohibited.
- B. PVC pipe, duct penetrations to be fire stopped same as metallic penetrations with the addition of an intumescent wrap to effectively close the hole if PVC vaporizes.
- C. Construction of permanent bracing, framing, roof curbs and platforms or other structures which utilize wood construction shall be fabricated from fire resistant treated materials or shall be otherwise protected by approved fire resistant materials.

1.16 ACCESS DOORS

- A. See architectural drawings and specifications for access door types. Assist in locating the access doors to avoid lights, ducts and piping and to provide the best access to overhead equipment, valves and balance dampers.

1.17 COMPLETION AND TESTS

- A. Complete and test each system as specified. Submit all reports required by the individual sections of specifications. Leave all systems in proper operation.
- B. At the time of finalizing the project, a demonstration of all systems shall be performed in the presence of the Project Manager's designated representative. The Contractor shall demonstrate that the systems perform in the manner described in the specifications and indicated on the drawings.

1.18 OPERATING INSTRUCTIONS

- A. The Contractor shall provide qualified personnel to instruct the Owner's maintenance personnel in the operation and maintenance of all the new systems and equipment. In general, these instructions may be given by the installer of the system. However, some equipment or systems require instruction be given by an authorized agent of the supplier or manufacturer. See Division 1 and individual Sections of this Division for specific training requirements.
- B. Written operation and maintenance instructions, as produced by the manufacturer, shall be provided for all equipment. These instructions shall be bound and submitted as described in this Section.

1.19 REMODELING WORK

- A. Wherever existing mechanical systems, plumbing, heating, service lines, piping, ducts, controls, etc., are cut, removed, or interrupted as a result of the contract work, all such items that serve areas or equipment that remain shall be replaced, rerouted, extended, relocated, etc., as necessary to maintain operation of equipment and services.
- B. Downtime shall be held to a minimum. Outages shall be scheduled at a time acceptable to and approved by the Project Manager. Consult with the Project Manager in sufficient time for him to make necessary preparations for the outage. Note specifically, that certain items of work are to be accomplished in Phases and according to outage limitations as noted on the plans or elsewhere in the construction documents. This contractor shall make all necessary provisions for meeting the

outage limitations and shall provide any and all necessary temporary work for the successful temporary operation of the systems until the final systems are installed under subsequent phases of work. This may include installation of temporary piping, and installation of temporary controls.

- C. Demolition
 - 1. Refer to the drawings for execution of demolition.
 - 2. Unless specifically noted otherwise on the plans, all existing equipment and material removed and not scheduled for reinstallation shall remain the property of Montana State University and shall be delivered to a designated stockpile area on the MSU campus. The stockpile location shall be as designated by the Project Manager. Materials not wanted by the University shall be removed from the site by the Contractor.
- D. Asbestos Awareness
 - 1. If suspect asbestos materials are encountered, the contractor shall cease work in that area and inform the Project Manager of his suspicions and will not proceed with work in that area until such time that a determination can be made on how to proceed.
- E. Site Investigation
 - 1. **The Contractor shall be cognizant that this is a remodeling project and as such, certain items cannot be fully illustrated nor explained without field observation.** Before submitting his proposal, the Contractor should examine the site and building as it pertains to this project and make allowances in his proposal for all conditions that will affect the work indicated in the project manual and contract documents. This would include hidden and other discovered obstacles such as existing pipes, ducts and equipment not necessarily shown on the project drawings.
- F. Site access may be arranged by contacting the Project Manager.

1.20 RECORD DRAWINGS

- A. A separate set of mechanical drawings shall be maintained at the job site at all times and shall be used as record drawings. This set shall be kept up to date with all changes and/or additions in the construction and/or mechanical systems, and shall be delivered to the Project Manager at the completion of this job. This set of drawings shall be kept clean and protected at all times. See Division 1 for additional requirements.
- B. The Project Manager will review the drawings periodically as the project progresses.

1.21 DRAINING AND FILLING OF EXISTING HYDRONIC SYSTEMS

- A. It is not anticipated that the scope of this project includes or necessitates interruption of the existing heating and chilled water systems in the building. Those systems are currently filled with a solution of water and a chemical inhibitor or with glycol. The University shall be notified at least 5 working days in advance if it becomes necessary to modify or otherwise interrupt these systems.

PART 2 SUBMITTALS AND BROCHURES OF EQUIPMENT

2.1 GENERAL

- A. The literature required to be submitted and approved in order to fulfill the requirements of this Division falls into two general categories. These are the "Brochures of Equipment" and "Submittals."
- B. "Submittals" is a general term for informational literature which must be supplied to and approved by the Contractor and the Project Manager prior to installing, receiving, or in some instances, even ordering equipment. The normal required types of submittals include shop drawings, manufacturer's literature, installation and operation instructions (from the manufacturer) and wiring diagrams. System reports, such as start-up reports or balancing reports, are forms of submittals which are required after the equipment has been installed and is operational
- C. Brochures of Equipment (also known as Operations and Maintenance Manuals) are booklets assembled by the contractor which contain operation, maintenance and repair literature for all equipment installed under the requirements of the project. They will be used by Laboratory personnel as the primary source of information for operating and maintaining the installed systems. As such, they shall exhibit a professional quality, high degree of clarity and technical completeness which will allow their use throughout the useful life of the installed system.
- D. In general, copies of all returned, approved submittals shall be included in the Brochures of Equipment. These books shall also include complete operation and maintenance literature for each piece of equipment such as may be packaged with the equipment for OEM components. They will be used by the Government's personnel as the primary source of information for operating and maintaining the installed systems and as such, they shall exhibit a high degree of clarity,

thoroughness and be arranged so as to be useful for their given purpose throughout the life of the installed systems.

2.2 SUBMITTALS

- A. Refer to Division 01 for submittal requirements. The Contractor shall submit all information listed in each individual Section of this Division and in accordance with Division 1 "Submittals".
- B. The contractor shall procure manufacturer's literature and/or certified prints for all items of equipment, materials or systems on the job. Shop drawings and literature shall be complete and marked showing name of job, item used, size, dimensions, capacity, rough-in, etc., as required for complete check and installation. Any exceptions of the equipment being furnished from that specified shall be clearly defined. Specific requirements of submittals may be expanded in individual specification sections. Minimum requirements shall include the following:
 - 1. Submit actual installation layout drawings on floor plans showing the systems as noted in the specification.
 - 2. Manufacturer's literature shall include any and all restrictions on the application and installed service limitations of the product.
- C. All shop drawings shall be reviewed, approved and stamped by the Contractor before ordering.
 - 1. The Contractor shall check submittals for number of copies, adequate identification, correctness and compliance with drawings and specifications and apply his stamp of approval before forwarding the submittal. Submittals shall be revised, changed and/or resubmitted until acceptable and approved by the Project Manager.
 - a. Approval of submittals and literature by the Project Manager shall not relieve the Contractor from responsibility for deviations from drawings or specifications, nor shall it relieve him from responsibility for errors in shop drawings or other submittal literature.
 - b. Submit number of copies as required in Division 01 "Submittal Procedures" for review.
 - c. Copies produced on copy machines which are not of a permanent or legible nature will not be accepted for shop drawing submittals. Copies must be legible with all dimensions and other pertinent data clear.
 - d. Equipment for no more than one section of specifications shall be included in each submittal.
 - e. Submittals will not receive partial approval. They will be either accepted or rejected in their entirety.

2.3 BROCHURES OF EQUIPMENT (AKA OPERATION AND MAINTENANCE MANUALS)

- A. The Contractor shall prepare and submit electronic/digital operations and maintenance manuals, also referred to herein as Brochures of Equipment, for all systems and equipment. Each shall contain all required submittal data for the construction materials and each piece of equipment (reference Section 01 3000 "Submittals") installed under this project. The literature required for submittal purposes shall be expanded to include operation and maintenance literature for each piece of equipment. Maintenance information shall be complete in every respect and shall include parts lists and assembly drawings wherever applicable. The Brochures shall also include a copy of the submittal requirement list. The manuals shall also meet all the requirements of "Operation and Maintenance Data" of Division 01.
- B. All literature shall clearly indicate the equipment it represents and shall be labeled with the equipment identification abbreviation found on the drawings, e.g. EF-1, etc. All information which is not applicable to the particular model and size supplied shall be clearly and neatly crossed out with heavy black marker or other suitable means. This includes dimensional drawings, maintenance information, parts lists, wiring diagrams, etc. Only the information applicable to the particular equipment supplied shall remain and it shall be easy to follow. Booklets not meeting these requirements shall be returned for correction.
- C. Formatting and media type shall be as specified in Division 1 "Operation and Maintenance Data".
- D. Dividers shall be used to separate the literature for equipment supplied under each of the various Sections of this Division. Divider headings shall read the same as the Section title e.g. "23 0523 Valves".
- E. The format of the Brochure shall begin with the submittal requirement list at the front as an index sheet. The dividers for each section shall then progress sequentially.
- F. Authorization for final payment shall not be made prior to final acceptance of the Brochures of Equipment.

G. Submittal of Brochure of Equipment will be required early in the construction schedule. See Division 01.

END OF SECTION 23 0000

SECTION 23 0514 - VARIABLE FREQUENCY DRIVE SYSTEMS

PART 1 GENERAL

1.1 DESCRIPTION

- A. It is the intent of this specification to set the minimum acceptable requirements for the design, engineering, manufacturing and supply of the Variable Frequency Drive (VFD) System specified for use on this project.
- B. All VFD systems for this project are to be furnished and installed by the Temperature Control Contractor under Section 23 0900.

1.2 TESTING & APPROVING AGENCIES

- A. UNDERWRITER'S LABORATORIES: Where the specifications require that items bear the label of the Underwriter's Laboratories, Inc., the Contractor shall submit proof that the item which he proposes to furnish under this specification conforms to the standard of Underwriter's Laboratories. The label of Underwriter's Laboratories shall be accepted as conforming to this requirement. In lieu of the label, the Contractor may submit a written certification from any nationally recognized testing agency, adequately equipped and competent to perform such services, that the specific item has been tested and conforms to the standards including method of test, of Underwriter's Laboratories.

1.3 QUALITY ASSURANCE

- A. The equipment and materials supplied shall be new, unused and shall be standard products of an established manufacturer who has produced, and had in operation, the type of equipment being supplied for at least five (5) years.
- B. The following VFD suppliers are acceptable. All drives being provided shall be by one manufacturer.
 - 1. Allen-Bradley
 - 2. Square D
 - 3. Danfoss-Graham
 - 4. ABB
 - 5. Schneider Electric
- C. If not listed above, vendor must apply to Engineer for approval prior to bid date showing point-by-point compliance with this specification.
- D. Drives which require motors made by same manufacturer or of a non-standard design shall not be acceptable.
- E. Prior to shipping any equipment, the manufacturer shall individually test and certify each unit to document compliance. This certification report shall be submitted as part of the operation and maintenance manual and include the following minimum testing:
 - 1. A visual inspection shall be made consisting of all system components, wiring connections, and safety mechanisms.
 - 2. A system run test shall be conducted using an actual motor accelerated and decelerated through the entire speed range.
 - 3. All control panel devices, including switches, pilot lamps, keypad and special control devices shall be functional tested.

1.4 CODES AND STANDARDS

- A. The equipment supplied under this specification shall conform to the latest applicable codes and standards of the following:
 - 1. NEC - (NFPA 70) - National Electric Code
 - 2. ANSI/NEMA ICS 6 - Enclosures for Industrial Controls and Systems
 - 3. NEMA AB 1 - Molded Case Circuit Breakers
 - 4. NEMA ICS 2 - Industrial Control Devices, Controllers, and Assemblies
- B. The fully assembled VFD system shall carry the UL label certifying UL-508 standards. An equivalent safety labeling program by ETL or CSA documenting compliance with the industry standard shall be acceptable.

1.5 SUBMITTALS

- A. The following shall be included in the submittal package in the quantities required under the general provisions of this project.
 - 1. Manufacturer's literature with complete technical data sheets indicating model numbers, ratings, limitations, tolerances, options accessories, etc.

2. Set of outline drawings giving complete mounting and conduit entry and exit dimensions.
3. Set of compliance electrical drawings for power and control wiring.

1.6 WARRANTY

- A. The VFD system vendor shall supply a complete parts and labor warranty (including travel expenses) for specified warranty period, see Division 1.
 1. The warranty shall cover the entire VFD system including power devices, controllers, filters, etc., enclosed as part of the system package.
 2. The warranty shall include on-site service within 24 hours and repair or replacement of defective components within 48 hours.

1.7 IDENTIFICATION

- A. Provide laminated nameplate (1/4" lettering) identifying load and feeder source. Label all operators and indicators on panel covers.

PART 2 PRODUCTS

2.1 MATERIALS

- A. The VFDs shall be supplied as a complete, pre-integrated, stand-alone package produced by a single manufacturer regularly engaged in the production of same and who maintains fully system support responsibility.
 1. The VFD manufacturer shall integrate all components and equipment required to meet these specification features and functions as a single UL (or equivalent) labeled system. Vendors providing equipment requiring panel shop or job site modifications or additions that would not be valid under the original equipment manufacturer's (OEM's) safety labeling will not be acceptable.
- B. Every VFD shall be provided with a bypass.
- C. The VFD shall be sized and designed to operate the type of load motor it is connected to at full load. Supplier is responsible for verifying motor type and nameplate data prior to ordering or shipping. Units shall be for variable torque loading.
- D. In addition to requirements in this specification section, any requirements called for in the schedule of motor starters and control equipment shall be built into the systems.

2.2 SYSTEM REQUIREMENTS

- A. All VFD components shall be housed in a grounded, dead front, free-standing or wall mounted, NEMA 1 enclosure. The VFD system size shall not exceed the size allotments specified on the drawings. The VFD system shall employ door-mounted industrial control operator devices, programming unit, and display to meet requirements of this specification.
- B. VFD systems mounted indoors shall be properly ventilated and sized to operate continuously at the job site elevation in an ambient environment of 0 degrees C to 40 degrees C, 0-90% RH.
- C. All components of the VFD system shall be selected to operate normally and continuously without any system trip or damage based on following supply power and load conditions.
 1. Plus or minus 10% voltage fluctuation.
 2. Plus or minus 5% frequency variation.
 3. Distorted voltage waveform with up to 7% total voltage harmonic distortion.
- D. The VFD system shall employ voltage sag ride-through coordination under normal operating (average load) conditions to prevent nuisance trips with the following utility interruptions (based on preliminary IEEE working group P1346 data):
 1. 0% voltage for 1 cycle
 2. 60% voltage for 10 cycles
 3. 87% voltage continuous
- E. All VFD systems shall have an overload capacity of a minimum of 120% for one minutes.
- F. Efficiency and Power Factor
 1. The VFD solid state convertor and inverter power switching components and control shall be selected to achieve a 95% efficiency or better at full load and speed.
 2. The entire true system power factor (as measured at the input to the VFD system) shall be 95% or better across the operational speed range.
- G. Protection
 1. Short circuit protection shall be provided to the VFD system through an externally operated, door interlocked fused disconnect, circuit breaker or motor circuit protector (MCP) rated at 65,000 AIC minimum. The door interlocked handle must be capable of being locked off to meet NEC.

2. Overcurrent protection shall be provided in the VFD system through electronic motor overload (MOL) circuits with instantaneous trip, inverse time trip, and current limit functions. These shall be adjustable and optimized for the application.
 3. In addition to the overcurrent protection above, the VFD system shall provide over and under voltage protection, over temperature protection, ground fault protection, and control of microprocessor fault protection. These protective circuits shall cause an orderly shutdown of the VFD, provide indication of the fault condition, and require a manual reset (except undervoltage) before restart. Undervoltage from a power loss shall be set to automatically restart after return to normal. The history of the previous three faults shall remain in memory for future review.
- H. The following operator control and indication features shall be provided standard (unless shown differently on the drawings) as part of each VFD system:
1. Hand-Off-Auto (local start at VFD, remote start with contact closure).
 2. Local-Remote speed control (local speed control at VFD, remote speed control through speed reference signal).
 3. Frequency (speed) indication.
 4. Motor voltage indication.
 5. Motor current indication.
 6. VFD run indication.
 7. VFD fault and diagnostic indication.
 8. Adjustable carrier frequency from 4-12 KHz minimum.
 9. See also schedule of motor starters and control equipment.
- I. The following customer connections and interface terminations shall be provided standard (unless shown differently on the drawings) as part of each VFD system:
1. VFD remote start/stop connection.
 2. External safeties connection.
 3. VFD run annunciation.
 4. VFD vault annunciation.
 5. VFD speed reference input connection (4-20mA or as shown on drawings). Reference input signal shall be galvanic isolated from drive circuitry.
- J. The following parameter adjustments shall be available to tune the VFD system:
1. Minimum and maximum speeds.
 2. Acceleration and deceleration times.
 3. Overcurrent trip point.
 4. Current limit response to overload.
 5. Maximum base motor voltage.
 6. Input speed reference signal gain and bias.
 7. Output speed reference signal gain and bias.
- K. The VFD shall be capable of starting into a rotating motor at any speed.
- L. For maintenance purposes, the VFD system shall be capable of starting, stopping, and running with stable operation with the motor completely disconnected (no load).

2.3 HARMONIC DISTORTION MITIGATION

- A. The VFD shall utilize DC bus choke or line filters and shall come with 5% line reactors. Designs which are not pre-integrated and factory wired as part of the UL (or equal) labeled VFD system shall not be acceptable under this specification.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Mounting and power connections shall be provided by the Temperature Control Contractor.
- B. Power connections and motor connections are to be made by the Electrical Contractor.
- C. Vendor to supply field start-up service by an authorized factory-trained and factory-based service representative consisting of system check-out, start-up and system run. The vendor shall provide warranty and authorized factory service including operator training. A written certificate of same shall be provided at start-up. VFD service technicians shall be full time employees of the vendor, factory or manufacturer (not sales representative), primarily engaged in VFD service work during normal business hours, but on call 24 hours.

3.2 SYSTEM STARTUP AND CERTIFICATION

- A. The VFD system start-up shall be performed by a service technician or engineer certified by the manufacturer. The following adjustments and tests shall be performed as a minimum with certified copies included in the maintenance and operation manual:
 - 1. Verify that the input voltage is within the manufacturer's specification tolerances.
 - 2. Verify that the motor rotation is correct in all modes of operation.
 - 3. Verify all operator devices, programming and monitoring functions to be fully operational.
 - 4. Verify operation of all field signal control connections.
 - 5. Measure and record system output voltage and current at 50% and 100% speed. Tune the output voltage to correspond to motor nameplate rating at full speed. Check full load current measurements against nameplate data.
 - 6. Make all parameter adjustments to tune and optimize the VFD system to the application. Record all configuration values as part of this report.

3.3 TRAINING

- A. Provide minimum of two (2) hours of on-site training by certified factory representative who has a minimum of five (5) VFD start-ups of similar application for trouble shooting, shut-down, resets, and start-up. Follow any requirements stated in Section 017900.

END OF SECTION 23 0514

SECTION 23 0517 - HVAC PIPING ACCESSORIES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Follow Section 22 0517 for all systems, materials and methods.

END OF SECTION 23 0517

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SECTION 23 0523 - VALVES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 WORK INCLUDED

- A. This Section governs the products used and the installation of all valves not specifically covered by other Sections of specifications.
- B. Valves covered elsewhere in the specifications shall be installed as indicated in their respective Section and in accordance with PART 3 'EXECUTION' of this Section.
- C. Where specific valve types are noted on the plans, provide only those type of valves. Where specific types of connection are specified, provide only valves with the specified type of connection (e.g. threaded). Conform to the requirements of this section for all valves.
- D. Unless otherwise specifically noted on plans or hereinafter, valves 3" and larger utilized on steam and condensate systems shall be ANSI Class 150 flanged cast steel or ductile iron gate valves with raised face as described below.

1.3 RESTRICTIONS

- A. Valves of the same type or function shall be of the same manufacturer throughout the project.
- B. Each valve shall have the manufacturer's name or symbol stamped or cast on the valve body.
- C. All valves shall be suitably rated for each application in regard to temperature, pressure and fluid type.
- D. All valves shall be designed and manufactured to the requirements of applicable federal specifications for the type and pressure class of valve.

1.4 SUBSTITUTIONS

- A. Substitution of the scheduled valves is allowable unless a specific model is called out in this Section or on the plans. See Section 23 0000 "General Provisions for Mechanical Work" for general requirements of substitutions.
- B. Substitute materials shall be equal or superior to the scheduled items in every respect. This includes design, materials of construction, ratings and adherence to federal specifications for design and manufacture.
- C. Sole authority regarding the acceptability of proposed substitutes rests with the Project Manager.

1.5 SUBMITTALS

- A. See Section 23 0000 "General Provisions for Mechanical Work" for general submittal requirements.
- B. All submittals shall clearly identify all features and materials of valve construction and information regarding compliance with applicable federal specifications. Items intended for use shall be clearly indicated and the intended application, e.g. low pressure steam, domestic cold water, etc., shall be listed.
- C. Submittals for substitute items shall clearly indicate any differences from, or exceptions to, scheduled valves.
- D. Provide installation instructions for any valves as requested by the Project Manager.

PART 2 PRODUCTS

2.1 GENERAL

- A. All valves and their components shall be new, clean and free of corrosion or other damage. Valves shall be stored indoors, protected from weather with covers over openings to prevent ingress of dirt and moisture.
- B. Valves showing signs of damage or corrosion shall be removed from the job site.

2.2 SPECIALTY ITEMS AND ACCESSORIES

- A. Provide specialty operators (e.g. chain operators, etc.), indicators, locks and stops, etc., as noted herein, shown on plans or required for proper function of the valve.

2.3 ACCEPTABLE MANUFACTURERS

- A. Equivalent products of Velan, Crane, Conbraco, Jomer, Hammond, Nibco, Milwaukee, Rockwell, Watts are acceptable. Other qualified manufacturers are not excluded.
- B. Manufacturers of specialty valves are approved only for the specified model. Approval of general product lines are not necessarily intended.

2.4 REQUIREMENTS OF DESIGN AND CONSTRUCTION

- A. Unless otherwise noted, all valves shall be pressure rated and stamped as listed below by application. Valves not stamped or valves used for other than water systems (e.g. glycol solutions, etc.) require manufacturer(s) certification for the intended application.
 - 1. General water and steam and condensate systems: 125 SWP and 200 WOG.
 - 2. Steam and condensate valves over a specific size shall be rated as noted elsewhere in Part 1 of this Section, above.
- B. Valve design features shall be as listed below for each type of valve unless otherwise approved.
 - 1. Gate Valves
 - a. Valves 3" and under for water and steam up to 100 psig: Bronze body, gland-packed, screw-in bonnet, solid wedge, rising stem, threaded or flanged connection.
 - 2. Globe Valves
 - a. Valves 3" and under for water and steam up to 100 psig: Bronze body, screw-in bonnet, renewable bronze disc, threaded connection.
 - 3. Ball Valves
 - a. Valves 3" and under shall have flanged or threaded connections. Valves over 3" to have flanged connections unless otherwise approved. Unless otherwise indicated, all valves shall be fitted with insulated lever operators, memory stops and extended stems for insulated piping.
 - b. Valves for general water service branch lines and terminal connections to be two-piece construction with full port design and shall be rated appropriately for the application as specified in part 'A' above.
 - c. Valves shall be two-piece or three-piece full port design and shall be rated appropriately for the application as specified in part 'A' above.
 - d. Valves for steam up to 100 psig shall be three piece full port design with reinforced TFE seals and stainless steel ball. Ball valves used for steam shall be rated 150 SWP & 400 WOG.
 - e. Ball valves shall not be used for steam service above 100 psig.
 - f. Ball valves may be used for steam service only through 1-1/2" sizes.
 - 4. Butterfly Valves
 - a. Butterfly valves shall not be used on this project.
 - 5. Check Valves: provide the following unless otherwise noted on the project plans.
 - a. General purpose check valves for water and low pressure steam shall be rated 125 SWP and 200 WOG. Condensate and boiler feed pump discharge check valves shall be rated at 125 WOG for steam pressures up to 100 psig.
 - b. General purpose valves 3" and smaller for water and low pressure steam: Bronze and/or stainless steel construction, horizontal or Y-pattern design with threaded bonnet and renewable disk. Disc material to be Buna-N for water, teflon for steam. Threaded connections.
 - 6. Drain Valves
 - a. Bronze body ball valve with stainless steel trim, integral hose thread, metal cap and chain. Valve ratings shall be 600 CWP.
 - b. Boiler drains and sill cocks shall not be used.

2.6 SCHEDULES

A. General water systems, steam condensate and steam:

TYPE	VALVE CONNECTION		MODEL NUMBER	
	TYPE	MANUFACTURER	UP TO 3"	OVER 3"
Gate	Solder	Nibco	111	(3"+ for steam)
		Milwaukee	149	
	Thread	Nibco	111	
		Milwaukee	1148	
Flange	Nibco		F-637-31	
	Milwaukee		1550-CB2	
Globe	Solder	Nibco	211	
		Milwaukee	1502	
	Threaded	Nibco	211	
		Milwaukee	502	
Flange	Nibco		F-738-B	
	Milwaukee			
Ball	Solder	Nibco (Water)	580	
		Nibco (Steam)	590-Y-66	
		Milwaukee (Water)	BA250	
		Milwaukee (Steam)	BA350S	
	Thread	Nibco (Water)	580	
		Nibco (Steam)	590-Y-66	
		Milwaukee (Water)	BA200	
		Milwaukee (Steam)	BA300S	
Flange	-Submit on proposed valves-			
Check (General Purpose)	Solder	Nibco	413	
		Milwaukee	1509	
	Thread	Nibco	413	
		Milwaukee	509	
Flanged	Nibco		918	
	Milwaukee		F-2974	

C. Drain valves

1. Nibco No. T-585-70-66-HC ball valve with stainless trim, integral hose thread, metal cap and chain.

2.7 EXCEPTIONS TO SCHEDULES

- Availability of sizes and connection types for listed models may be limited in some cases. In such an instance, flanged connections may be used for valves less than 2" in size but screwed or soldered connections on sizes larger than 2" will not be allowed without Project Manager's approval.
- When model numbers are identical for valves with seats or discs of different composition, the materials appropriate for the intended service shall be supplied.

2.8 APPLICATION

- In general, install valves of the type and size indicated on drawings.
- Ball valves shall be used where indicated on plans and shall also generally be used in lieu of gate valves provided they meet the service ratings of the application. However, gate valves shall be used where specifically indicated. Butterfly valves shall not be used.
- Ball valves shall not be used in lieu of balancing valves. Balancing valves shall be as scheduled and as specified with hydronic piping systems.

PART 3 INSTALLATION

3.1 GENERAL

- A. Orient axis of valve stems so that in the event of stem packing leakage, fluid will not drip or run on pipe(s) below. Example: rotate valves on horizontal pipe 45° from vertical.
- B. Service and tighten all packing glands on valves so equipped so there is no leakage. Replace defective packing.
- C. Install drain valves and air vents in all locations indicated on plans and in all additional locations necessary to allow complete system drainage.
- D. Label or tag valves as specified.
- E. Identify and turn over any loose valve keys or operators.

END OF SECTION 23 0523

SECTION 23 0529 - SUPPORTS, ANCHORS AND BASES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Support and anchor all piping and equipment installed under Division 23 as specified in Section 22 0529.

END OF SECTION 23 0529

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SECTION 23 0553 - IDENTIFICATION FOR HVAC PIPING, EQUIPMENT AND DUCTWORK

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Work of Division 23 piping, equipment and ductwork identification shall follow Division 22 Section 22 0553.

END OF SECTION 23 0553

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SECTION 23 0593 - TESTING, ADJUSTING, AND BALANCING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. The work of this Section shall be accomplished in coordination and together with work associated with that of Test and Balance Section 23 0900 "Building Management and Control System" and all applicable commissioning specifications.

1.2 SUMMARY

- A. **Note that the work required will include multiple test and balance procedures and measurement and recording of room-to-room pressure relationships.**
 - 1. **An initial report for the airflow systems is required before any work takes place. Measure and record supply and exhaust airflow in both the clean and dirty cagewash rooms and the room pressure differential. Accomplish the readings once with the cagewasher not operational and once with the cagewasher operating in the exhaust mode.**
 - 2. **Assist in establishing proper airflow orientations in and around the cagewash area immediately after the temporary construction enclosure is erected, just prior to the start of demolition. Submit an area plan marked up with the airflow orientations established in the clean and dirty cagewash rooms and the rooms which border them.**
 - 3. **Perform complete measurements, but for all affected rooms and areas noted on the plans, after the new cagewash equipment is put in place and all systems are operational.**
 - 3. **Do not adjust any fan or air handling unit not affected by this project.**
 - 4. **Accomplish all work with the assistance of the mechanical contractor and the temperature controls contractor. Assist them in making system adjustments so that all required pressure relationships are maintained under all operating cycles for the cagewash unit.**
- B. This Section includes testing, adjusting, and balancing HVAC systems to produce design objectives, including the following:
 - 1. Conducting preliminary testing to determine existing operating conditions of existing air systems as noted above.
 - 2. Balance airflow for all operating cycles of the new cagewash equipment following installation of new systems and modification of existing systems and ensure the proper room-to-room pressure relationships are being maintained under all conditions.
 - 3. Measure and record fan equipment performance parameters.
 - 4. Measuring electrical performance of HVAC equipment.
 - 5. Measure and record hot and cold water flow rates to the new cagewash equipment and both static and dynamic water pressures.
 - 6. Verifying that temperature controls are functioning properly.
 - 7. Reporting results of the activities and procedures specified in this Section.
- C. In concert with Paragraph B, above, prepare a report specifically citing the final volumetric offsets between supply and exhaust air, airflow directions, and pressure gradients established at all doors shown on the space pressurization plans. Include a marked up drawing graphically depicting this information in addition to a typewritten report. The final report shall include this information.

1.3 DEFINITIONS

- A. **Adjust:** To regulate fluid flow rate and air patterns at the terminal equipment, such as to reduce fan speed or adjust a damper.
- B. **Balance:** To proportion flows within the distribution system, including submains, branches, and terminals, according to design quantities.
- C. **Draft:** A current of air, when referring to localized effect caused by one or more factors of high air velocity, low ambient temperature, or direction of airflow, whereby more heat is withdrawn from a person's skin than is normally dissipated.
- D. **Procedure:** An approach to and execution of a sequence of work operations to yield repeatable results.
- E. **Report Forms:** Test data sheets for recording test data in logical order.

- F. Static Head: The pressure due to the weight of the fluid above the point of measurement. In a closed system, static head is equal on both sides of the pump.
- G. Suction Head: The height of fluid surface above the centerline of the pump on the suction side.
- H. System Effect: A phenomenon that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.
- I. System Effect Factors: Allowances used to calculate a reduction of the performance ratings of a fan when installed under conditions different from those presented when the fan was performance tested.
- J. Terminal: A point where the controlled medium, such as fluid or energy, enters or leaves the distribution system.
- K. Test: A procedure to determine quantitative performance of a system or equipment.
- L. Testing, Adjusting, and Balancing Agent: The entity responsible for performing and reporting the testing, adjusting, and balancing procedures.
- M. AABC: Associated Air Balance Council.
- N. AMCA: Air Movement and Control Association.
- O. CTI: Cooling Tower Institute.
- P. NEBB: National Environmental Balancing Bureau.
- Q. SMACNA: Sheet Metal and Air Conditioning Contractors' National Association.

1.4 SUBMITTALS

- A. Quality-Assurance Submittals: Within 30 days from the Contractor's Notice to Proceed, submit 2 copies of evidence that the testing, adjusting, and balancing Agent and this Project's testing, adjusting, and balancing team members meet the qualifications specified in the "Quality Assurance" Article below.
- B. Contract Documents Examination Report: Within 45 days from the Contractor's Notice to Proceed, submit 2 copies of the Contract Documents review report as specified in Part 3 of this Section.
- C. Strategies and Procedures Plan: Within 60 days from the Contractor's Notice to Proceed, submit 2 copies of the testing, adjusting, and balancing strategies and step-by-step procedures as specified in Part 3 "Preparation" Article below. Include a complete set of report forms intended for use on this Project.
- D. Preliminary Conditions Report for existing heating and chilled water systems.
- E. Intermediate Conditions Report indicating airflow orientations established after the temporary construction enclosure is erected.
- F. Final Certified Testing, Adjusting, and Balancing Reports: Submit 2 copies of reports prepared, as specified in this Section, on approved forms certified by the testing, adjusting, and balancing Agent.
- G. Sample Report Forms: Submit 2 sets of sample testing, adjusting, and balancing report forms.

1.5 QUALITY ASSURANCE

- A. Agent Qualifications: Engage an approved testing, adjusting, and balancing agent currently certified by either AABC or NEBB.
- B. The contractor shall submit the name and credentials of the TAB firm for review and approval no later than 14 days before bid date.
 - 1. The TAB firm shall provide qualifications of both the firm and of the individual who is to do the test and balance. Provide proof of completed balancing work on at least five projects of similar size and scope, along with a list of references which may verify qualifications.
 - 2. Final approval of the TAB firm will be at the Project Manager's discretion, based on the information submitted and geological location of the firm or individual who is to perform the work.
- C. Testing, Adjusting, and Balancing Conference: Meet with the Project Manager on approval of the testing, adjusting, and balancing strategies and procedures plan to develop a mutual understanding of the details. Ensure the participation of testing, adjusting, and balancing team members, equipment manufacturers' authorized service representatives, HVAC controls Installer, and other support personnel. Provide 14 days' advance notice of scheduled meeting time. Meeting to be held at GSD offices or at Cogswell Building as arranged by the Project Manager.
 - 1. Agenda Items: Include at least the following:
 - a. Submittal distribution requirements.
 - b. Contract Documents examination report.
 - c. Testing, adjusting, and balancing plan.
 - d. Work schedule and Project site access requirements.
 - e. Coordination and cooperation of trades and subcontractors.

- f. Coordination of documentation and communication flow.
- D. Certification of Testing, Adjusting, and Balancing Reports: Certify the testing, adjusting, and balancing field data reports. This certification includes the following:
 1. Review field data reports to validate accuracy of data and to prepare certified testing, adjusting, and balancing reports.
 2. Certify that the testing, adjusting, and balancing team complied with the approved testing, adjusting, and balancing plan and the procedures specified and referenced in this Specification.
- E. Testing, Adjusting, and Balancing Reports: Use standard forms from AABC's "National Standards for Testing, Adjusting, and Balancing."
- F. Instrumentation Type, Quantity, and Accuracy: As described in AABC national standards or as described in NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems," Section II, "Required Instrumentation for NEBB Certification."
- G. Instrumentation Calibration: Calibrate instruments specifically for this project. Provide calibration certificates to Project Manager before work begins.

1.6 PROJECT CONDITIONS

- A. Owner Occupancy: State Health Lab personnel will continue to utilize the entire building with the exception of areas closed for construction and may occupy completed areas of the building before Substantial Completion. Cooperate with the Owner during testing, adjusting, and balancing operations to minimize conflicts with laboratory operations.

1.7 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 testing, adjusting, and balancing activities.
- B. Notice: Provide 7 days' advance notice for each test. Include scheduled test dates and times.
- C. Perform testing, adjusting, and balancing after leakage and pressure tests on air and water distribution systems have been satisfactorily completed.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine Contract Documents to become familiar with project requirements and to discover conditions in systems' designs that may preclude proper testing, adjusting, and balancing of systems and equipment.
 1. Contract Documents are defined in the General and Supplementary Conditions of the Contract.
 2. Verify that balancing devices, such as test ports, gauge cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers, are required by the Contract Documents. Verify that quantities and locations of these balancing devices are accessible and appropriate for effective balancing and for efficient system and equipment operation.
- B. Examine approved submittal data of HVAC systems and equipment.
- C. 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 their locations are accessible and appropriate for effective balancing and for efficient system and equipment operation.
- D. Examine automatic temperature control system components to verify the following:
 1. Dampers, valves, and other controlled devices operate by the intended controller.
 2. Fan status is indicated and dampers are in the position indicated by the controller.
 3. Sequence of operation for control modes is according to the Contract Documents.
 4. Controller set points are set at design values. Observe and record system reactions to changes in conditions. Record default set points if different from design values.
 5. Interlocked systems are operating as intended.
- E. Report deficiencies discovered before and during performance of testing, adjusting, and balancing procedures as soon as they are known.

3.2 PREPARATION

- A. Prepare a testing, adjusting, and balancing plan that includes strategies and step-by-step procedures.
- B. Complete system readiness checks and prepare system readiness reports. Verify the following:

1. Cagewash installation is complete and the unit is operational.
2. Permanent electrical power wiring is complete.
3. Automatic temperature-control systems are operational.
4. Equipment and duct access doors are securely closed.
5. Ceilings are installed in critical areas where air-pattern adjustments are required and access to balancing devices is provided.
6. Doors can be closed and wall panel systems are in place and sealed so that design conditions for system operations can be met.

3.3 GENERAL TESTING AND BALANCING PROCEDURES

- A. Perform testing and balancing procedures on each system according to the procedures contained in AABC national standards and this Section.
- B. At Contractor's option, 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.
- C. 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 the insulation Specifications for this Project. Identify location of all probe holes which are hidden by re-insulation, etc. The method of closing probe holes in ductwork is to be approved by the Project Manager.
- D. Mark equipment settings with paint or other suitable, permanent identification material, including damper-control positions, valve indicators, fan-speed-control levers, and similar controls and devices, to show final settings.

3.4 FUNDAMENTAL AIR SYSTEMS' BALANCING PROCEDURES

- A. Prepare test reports for both fans and outlets. Obtain manufacturer's fan curves and diffuser outlet factors and recommended testing procedures. Crosscheck the summation of required outlet volumes with required fan volumes.
- B. Prepare schematic diagrams of systems' "as-built" duct layouts.
- C. Determine the best locations in main and branch ducts for accurate duct airflow measurements.
- D. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.
- E. Verify that motor starters are equipped with properly sized thermal protection.
- F. Check dampers for proper position to achieve desired airflow path.
- G. Check for airflow blockages.
- H. Check condensate drains for proper connections and functioning.

3.5 CONSTANT-VOLUME AIR SYSTEMS' BALANCING PROCEDURES

- A. The procedures in this Article apply to constant-volume supply-, return-, and exhaust-air systems including cagewash exhaust ducts, canopy hoods, and heat recovery units. The procedures apply to each operational control sequence of the cagewash area HVAC system.
- B. Adjust fans to deliver total design airflows within the maximum allowable rpm listed by the fan manufacturer.
 1. Measure fan static pressures to determine actual static pressure as follows:
 - a. Measure outlet static pressure as far downstream from the fan as practicable and upstream from restrictions in ducts such as elbows and transitions.
 - b. Measure static pressure directly at the fan outlet or through the flexible connection.
 - c. Measure inlet static pressure of single-inlet fans in the inlet duct as near the fan as possible, upstream from flexible connection and downstream from duct restrictions.
 2. Measure static pressures entering and leaving other devices such as heat recovery equipment and autoclave and cagewasher canopy hoods under final balanced conditions.
 3. Compare design data with installed conditions to determine variations in design static pressures versus actual static pressures.
 4. Adjust fan speed higher or lower than design with the approval of the Project Manager. Make required adjustments to pulley sizes, motor sizes, and electrical connections to accommodate fan-speed changes. Do not make final fan speed adjustments at VFD speed controller on variable speed fans without Project Manager permission.

- C. Adjust volume dampers for main duct, submain ducts, and major branch ducts to design airflows within specified tolerances.
 - 1. Measure static pressure at a point downstream from the balancing damper and adjust volume dampers until the proper static pressure is achieved.
 - a. Where sufficient space in submains and branch ducts is unavailable for Pitot-tube traverse measurements, measure airflow at terminal outlets and inlets and calculate the total airflow for that zone.
 - 2. Re-measure each submain and branch duct after all have been adjusted. Continue to adjust submains and branch ducts to design airflows within specified tolerances.
- D. Measure terminal outlets and inlets without making adjustments.
 - 1. Measure terminal outlets using a direct-reading hood or the outlet manufacturer's written instructions and calculating factors.
- E. Adjust terminal outlets and inlets for each space to design airflows within specified tolerances of design values. Make adjustments using volume dampers rather than extractors and the dampers at the air terminals.
 - 1. Adjust each outlet in the same room or space to within specified tolerances of design quantities without generating noise levels above the limitations prescribed by the Contract Documents.
 - 2. Adjust patterns of adjustable outlets for proper distribution without drafts.

3.6 MOTORS

- A. Motors, 1/2 HP and Larger: Test at final balanced conditions and record the following data:
 - 1. Manufacturer, model, and serial numbers.
 - 2. Motor horsepower rating.
 - 3. Motor rpm.
 - 4. Efficiency rating if high-efficiency motor.
 - 5. Nameplate and measured voltage, each phase.
 - 6. Nameplate and measured amperage, each phase.
 - 7. Starter thermal-protection-element rating.
- B. 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.

3.7 AIR FLOW & CONTROL VERIFICATION

- A. Verify that air volume controllers are sequencing and operating in the manner described in Section 23 0900 "Building Management and Control System" and as noted on the plans.
- B. Verify that air supply dampers and exhaust fans respond to maintain a constant and proper room pressure relationship to adjacent areas during all modes of system operation.
- C. Discrepancies discovered in sequencing, response or air flow shall be reported to and corrected in full cooperation with the test and balance contractor, mechanical contractor and Project Manager.
- D. Include verification and adjusting of airflow control and room pressurization in final T & B report.

3.8 INITIAL SYSTEMS REPORT

- A. Pre-Construction Phase Report: Prior to start of construction, prepare and submit a test report indicating the existing operating conditions for the airflows in the cagewash areas and those immediately adjacent to cagewash areas.
- B. Preliminary Report: Submit a preliminary TAB report prior to the start of any functional performance testing per the Commissioning specifications.

3.9 FINAL REPORT

- A. General: Typewritten, or computer printout in letter-quality font, on standard bond paper, in 3-ring binder, tabulated and divided into sections by tested and balanced systems.
- B. Include a certification sheet in front of binder signed and sealed by the certified testing and balancing engineer.
 - 1. Include a list of the instruments used for procedures, along with proof of calibration.
- C. Final Report Contents: In addition to the certified field report data, include the following:
 - 1. Fan 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 approved Shop Drawings and Product Data.
- D. General Report Data: In addition to the form titles and entries, include the following data in the final report, as applicable:
1. Title page.
 2. Name and address of testing, adjusting, and balancing Agent.
 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 testing, adjusting, and balancing Agent who certifies the report.
 10. Summary of contents, including the following:
 - a. Design versus final performance.
 - b. Notable characteristics of systems.
 - c. Description of system operation sequence if it varies from the Contract Documents.
 11. Nomenclature sheets for each item of equipment.
 12. Data for terminal units, including manufacturer, type size, and fittings.
 13. Notes to explain why certain final data in the body of reports vary from design values.
 14. Test conditions for fans performance forms, including the following:
 - a. Settings for dampers.
 - b. Conditions of any filters.
 - c. Variable frequency drive settings for variable-air-volume systems.
 - d. Settings for supply-air, static-pressure controller.
 - e. Other system operating conditions that affect performance.
- E. System Diagrams: Include schematic layouts of air distribution systems.
- F. Fan Test Reports: For exhaust fans, include the following:
1. Fan Data: Include the following:
 - a. System identification.
 - b. Location.
 - c. Make and type.
 - d. Model number and size.
 - e. Manufacturer's serial number.
 - f. Arrangement and class.
 - g. Sheave make, size in inches (mm), and bore.
 - h. Sheave dimensions, center-to-center and amount of adjustments in inches.
 2. Motor Data: Include the following:
 - a. Make and frame type and size, efficiency, insulation class.
 - b. Horsepower and rpm.
 - c. Volts, phase, and hertz.
 - d. Full-load amperage and service factor.
 - e. Sheave make, size in inches, and bore.
 - f. Sheave dimensions, center-to-center and amount of adjustments in inches .
 - g. Number of belts, make, and size.
 3. Test Data: Include design and actual values for the following:
 - a. Total airflow rate in cfm.
 - b. Total system static pressure in inches wg.
 - c. Fan rpm.
 - d. Discharge static pressure in inches wg.
 - e. Suction static pressure in inches wg.
- G. Duct Traverse Reports: Include a diagram with a grid representing the duct cross-section and record the following:
1. Report Data: Include the following:
 - a. System and air-handling unit number.
 - b. Location and zone.
 - c. Traverse air temperature in deg F.

- d. Duct static pressure in inches wg.
 - e. Duct size in inches.
 - f. Duct area in sq. ft..
 - g. Design airflow rate in cfm.
 - h. Design velocity in fpm.
 - i. Actual airflow rate in cfm.
 - j. Actual average velocity in fpm.
- H. Air-Terminal-Device Reports: For terminal units, include the following:
- 1. Unit Data: Include the following:
 - a. System and function (i.e. supply, exhaust).
 - b. Location and zone.
 - c. Test apparatus used.
 - d. Area served.
 - e. Air-terminal-device number from system diagram.
 - 2. Test Data: Include design and actual values for the following:
 - a. Airflow rate in cfm.
 - b. Air velocity in fpm.
 - c. Preliminary airflow rate as needed in cfm.
 - d. Preliminary velocity as needed in fpm.
 - e. Final airflow rate in cfm.
 - f. Final velocity in fpm.

3.10 SPACE PRESSURIZATION PLAN AND REPORT

- A. Using a micro-manometer, measure and record the relative pressure differential at every door where a pressure differential or directional airflow orientation is depicted to be established on the airflow pressure cascade plans in the mechanical drawings. Submit the recorded airflows and differential pressure values, in both tabular report form and on marked up plan sheets.
- B. Submit a separate plan and report for each operational attitude of the cagewash unit.

END OF SECTION 23 0593

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SECTION 23 0713 - MECHANICAL SYSTEMS INSULATION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B Follow Section 22 0719 for installation of insulation systems installed for systems and equipment installed under Division 23 specifications.

END OF SECTION 23 0713

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SECTION 23 0900 - BUILDING MANAGEMENT AND CONTROL SYSTEM

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. The work of this Section shall be carefully coordinated with the work of the test and balance contractor to achieve required airflow orientation among the cagewash areas for biologic control during both the intermediate construction stage while the temporary construction enclosure is erected and for the final systems arrangement once the cagewasher is erected and is started up.
- C. See electrical drawings and specifications for lighting and power requirements and locations. Follow Division 26 "Electrical" for all electrical work associated with HVAC controls as well as lighting controls.

1.2 GENERAL

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. **The control system shall be an expansion of the Schnieder Electric/Invensys system installed by MTI in 2016. All modifications and additions to the system shall be performed by MTI. The contact number for MTI is 406-245-8340.**

1.3 SUMMARY

- A. This Section includes control equipment for HVAC systems and components. It includes interfacing with the cagewash equipment exhaust damper contacts or relay to energize a new roof-mounted exhaust fan. As noted above, the work of this Section shall be carefully coordinated with the work of the test and balance contractor to achieve required airflow orientation among the cagewash areas for biologic control during both the intermediate construction stage while the temporary construction enclosure is erected and for the final systems arrangement once the cagewasher is erected and is started up. Coordinate also with the cagewash machine supplier and installer. Schedule all work so that the control system is ready for immediate use at each phase of work in order to minimize airflow reversals in the affected areas.
- B. Related Division 23 "General Provisions for Mechanical Work" Specification Sections: Division 23 Sections 23 0514 "Variable Frequency Drives for HVAC Equipment" and 23 0593 "Testing, Adjusting and Balancing" contain requirements that relate to this Section.
- C. The variable frequency drives for this project shall comply with the requirements of Section 23 05 14. It is a contract requirement for the variable frequency drives to be provided by the temperature control contractor. The control contractor shall coordinate with the supplier of the variable frequency drives when formulating his bid to ensure compatibility with the controls systems and compliance with any total harmonic distortion limitations stated in Section 23 0514.
- E. All controls components shall be new unless otherwise specified on the drawings.
- F. All new controls shall be standalone and configured to provide separate controllers and major I/O modules and field devices for each primary control function of the air handling, exhaust and cooling system components serving the animal areas and any biological safety cabinets and downdraft tables. Configure the systems so that failure of a single controller/component will not remove more than one major piece of equipment from service.
- G. For equipment furnished with BACnet interface cards – such as VFD's and other factory controllers, the control contractor shall monitor available information for all units and depict the information on the system graphics. The control contractor shall also create at least one virtual point for each piece of equipment to give and log a general alarm.

1.4 SYSTEM DESCRIPTION

- A. The control system modifications shall consist, as necessary, of digital controllers or expansion modules, sensors, transmitters, relays, actuators, other apparatus, accessories, and software as required and shall be connected to the existing distributed controllers operating in multitasking, multiuser environment on a token-passing network and programmed to operate mechanical systems according to sequences of operation indicated or specified. All ancillary equipment, interconnecting wiring, wiring devices and any and all items and components required for complete and proper

operation of this system shall be provided by this Contractor whether shown or specified or not, at no additional cost to the University. The system upgrades provided shall be complete and usable.

- B. Provide new dedicated graphics depicting all pertinent information of the systems and equipment added to the existing controls system. Install any and all additional memory capacity to the existing building operators' terminals as required.

1.5 SEQUENCE OF OPERATION

- A. System operating sequences are described on the contract drawings.

1.6 SUBMITTALS

- A. General: Submit each item in this Article according to the Conditions of the Contract and Division 01 Specification Sections.
- B. Product Data for each type of product specified. Include manufacturer's technical Product Data for each control device furnished, indicating dimensions, capacities, performance characteristics, electrical characteristics, finishes of materials, installation instructions, and startup instructions.
- C. Shop Drawings from manufacturer detailing equipment assemblies and indicating dimensions, weights, loadings, required clearances, method of field assembly, components, and location and size of each field connection.
- D. Shop Drawings containing the following information for each control system:
 - 1. Schematic flow diagrams showing all new or altered fans, VFD's, dampers and differential pressure transmitters.
 - 2. Each control device shall be labeled with setting or adjustable range of control.
 - 3. Diagrams for all required electrical wiring. Clearly differentiate between factory-installed and field-installed wiring. Provide with a complete diagram of system architecture.
 - 4. Sequences of operation.
 - 5. Plans denoting the proposed location of all controllers and field devices.
 - 6. Trunk cable schematic showing component and control unit locations and trunk data conductors.
 - 7. Listing of connected data points, including connected control unit and input device.
 - 8. System graphics indicating all systems, data (connected and calculated) point addresses, and operator notations.
 - 9. Damper actuator information including the torque requirements of the existing, installed dampers, the torque capacity of the new actuator, fail position, and NEMA rating and ambient temperature range.
- E. Wiring diagrams detailing wiring for power, signal, and control systems and differentiating clearly between manufacturer-installed and field-installed wiring.
- F. Maintenance data for control systems equipment to include in the operation and maintenance manual specified in Division 01. Include the following:
 - 1. Maintenance instructions and spare parts lists for each type of control device.
 - 2. Interconnection wiring diagrams with identified and numbered system components and devices.
 - 3. Keyboard illustrations and step-by-step procedures indexed for each operator function.
- G. Project Record Documents: Record actual locations of control components, including control units and sensors. Revise Shop Drawings to reflect actual installation and operating sequences.

1.7 QUALITY ASSURANCE

- A. **Vendor Qualifications:** It is intended that the minimal control work to be accomplished under this project by accomplished only by MTI of Billings, Montana (contact 406-245-8340), the installed of the major control system modifications in this building accomplished in 2016-2018 during a major HVAC systems replacement project.
- B. **Allowable Systems:** See paragraph 1.2, above.
- C. Comply with NFPA 90A.
- D. Comply with NFPA 70.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Store equipment and materials inside and protected from weather.
- B. Factory-Mounted Components: Where control devices specified in this Section are indicated to be factory mounted on equipment, arrange for shipping control devices to unit manufacturer.

1.9 WIRING AND ELECTRICAL

- A. Provide and install all required electrical provisions in accordance with Part 3 of this Section and Division 26 "Electrical". Provide UPS powered circuits to any new controllers, I/O modules and other field devices. Circuits utilized to gain line voltage power are the responsibility of the Controls Contractor.
- B. All components, wiring and raceway shall be rated for the environment in which they are installed. The space above the cagewash unit and within 15 feet of the unit shall be rated for 100% humidity environments at temperature of 50°C.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Products to be employed in execution of this project are not restricted to specific manufacturers. **However, all applicable products shall strictly be NIST traceable and industrial grade in nature.** Items found not meeting this requirement shall be removed and replaced at no cost to the University. The sole judge of equipment grade shall be at the discretion of the Project Manager.

2.2 DIRECT DIGITAL CONTROL (DDC) EQUIPMENT

- A. Control Units: Modular, comprising processor board with programmable, nonvolatile, random-access memory; local operator access and display panel; integral interface equipment; and back-up power source.
 - 1. Units monitor or control each input/output point; process information; execute commands from other control units, devices, and operator stations; and download from or upload to operator station.
 - 2. Stand-alone mode control functions operate regardless of network status. Functions include the following:
 - a. Global communications.
 - b. Discrete/digital, analog, and pulse input/output.
 - c. Monitoring, controlling, or addressing data points.
- B. Local Area Networks (LANs): BACnet.
 - 1. System Support: Capacity for a minimum of 10 workstations connected to multiuser, multitasking environment.
- C. Software: Update to latest version of software at project completion. Include and implement the following capabilities from the control units: Units of Measure: Inch-pound and SI metric.
 - 1. Load Control Programs: Demand limiting, duty cycling, automatic time scheduling, start/stop time optimization, night setback/setup, DDC with fine tuning, and trend logging.
 - 2. Programming Application Features: Include trend point, alarm messages, weekly scheduling, and interlocking.

2.3 CONTROL PANELS

- A. Local Control Panels: Provide any panels or expansion modules required for system expansion. Expansion modules and new panels shall match existing panels installed in 2016 to the greatest practicable extent. New panels or expansion modules shall provide not less than 50% spare inputs and outputs.

2.4 SENSORS

- A. Electronic Sensors: Vibration and corrosion resistant, for wall, immersion, or duct mounting as required.
 - 1. Humidity Sensors: Bulk polymer sensor element.
 - a. Accuracy: 3 percent full range with linear output.
 - b. Duct and Outside Air Sensors: With element guard and mounting plate, range of 0 to 100 percent relative humidity.
 - 2. Static-Pressure Transmitter: Non-directional sensor with suitable range for expected input, temperature compensated. NIST traceable.
 - a. Accuracy: 2 percent of full scale with repeatability of 0.5 percent.
 - b. Output: 4 to 20 mA.
 - c. Building Static-Pressure Range: 0 to 0.25 inch wg (0 to 62 Pa).
- B. Equipment Operation Sensors: As follows:

1. Status Inputs for fans: Current transducers with current sensing capability to detect fan belt loss or motor failure.

2.5 DAMPER ACUATORS

- A. Provide a new modulating electric actuator for Damper D-123 sized for not less than 200% of the damper's rated torque requirement. Secure manufacturer's data and provide actuators sized accordingly.
- B. Operators: Self-contained, proportional with spring return as appropriate to application for fail-safe operation, actuator with 60-second full travel.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify the existence and function of existing controls for Damper D-123. Verify that field end devices and wiring are installed before proceeding with installation.

3.2 INSTALLATION

- A. Install equipment as indicated to comply with manufacturer's written instructions.
- B. Install software in control units and operator workstations. Implement all features of programs to specified requirements and appropriate to sequence of operation.
- C. Connect and configure equipment and software to achieve the sequence of operation specified.
- D. Verify location of thermostats exposed control sensors with plans and room details before installation.

3.3 ELECTRICAL WIRING AND CONNECTIONS

- A. Install raceways, boxes, and cabinets according to Division 26 "Electrical" Sections 26 0533 "Raceways Boxes for Electrical Systems".
- B. Install building wire and cable according to Section 26 0519 "Low Voltage Electrical Power Conductors and Cable".
 1. All control cable shall be in raceway.
 2. Fasten flexible conductors, bridging cabinets and doors, neatly along hinge side; protect against abrasion. Tie and support conductors neatly.
 3. Number-code or color-code conductors, except local individual room controls, for future identification and servicing of control system.
 4. Connect electrical components to wiring systems and to ground as indicated and instructed by manufacturer. Tighten connectors and terminals, including screws and bolts, according to equipment manufacturer's published torque-tightening values for equipment connectors. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals according to tightening requirements specified in UL 486A.
 5. Connect HAND-OFF-AUTO selector switches to override automatic interlock controls when switch is in HAND position.

3.4 STARTUP

- A. Manufacturer's Field Services: Provide the services of a factory-authorized service representative to start control systems and to tune control algorithms to achieve proper system operation under all operating, startup and shutdown conditions.
- B. Test and adjust controls and safeties. Ensure that all control equipment interlocks function in all operational conditions, that all systems function in all modes and that all monitoring for all VFD's, and other equipment provided with BACnet interface is functional and accurate.
- C. Replace damaged or malfunctioning controls and equipment.
- D. Start, test, and adjust control systems. Tune all time delays, ramp speeds, interlocks, etc., to ensure that systems are optimized to provide non-reversing airflow directions, prevent pressure differential overshooting and minimize time of response/lack of airflow to all spaces.
- E. Demonstrate all functions in all operational conditions and verify compliance with requirements.
- F. Adjust, calibrate, and fine tune circuits and equipment to achieve sequence of operation specified and maintain space pressure differential relationships.
 1. Field verify the accuracy of all differential pressure readings with hand-held instrumentation to be within 5% of readings indicated by control system.
 2. Calibrate or replace all sensors as required to meet the above criteria.

3.5 DEMONSTRATION AND TRAINING

- A. Manufacturer's Field Services: Provide the services of a factory-authorized service representative to demonstrate and train the University's maintenance personnel as specified below.
 - 1. Train Government's maintenance personnel on procedures and schedules related to startup and shutdown, troubleshooting, servicing, and preventive maintenance.
 - 2. Schedule and provide training in accordance with Division 1 of specifications.
 - 3. Provide operator training on data display, alarm and status descriptors, requesting data, execution of commands, data logging and trending.
 - 4. Schedule training not less than seven days in advance. Provide not less than eight hours of total instruction, scheduled at the convenience of the Owner and approval of the Project Officer.

3.6 SYSTEMS ADJUSTMENT AND COORDINATION

- A. Coordinate work with that of the mechanical contractor and that of the test and balance contractor to establish proper space pressurization throughout the building. Tune all control loops to optimize control response rates, fan speed ramp rates and start staggers to insure consistent space differential pressure control under all operating modes.

END OF SECTION 23 0900

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SECTION 23 1100 - GENERAL REQUIREMENTS FOR PIPE AND PIPE FITTINGS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. See Sections 23 0000 "General Provisions for Mechanical Work", 23 21 13 "Hydronic Piping Systems" and 23 2213 "Steam and Condensate Piping" for testing and certification of piping systems. See elsewhere in this Section for required third party testing and contractor responsibility.
- C. Section 22 1100 shall govern the work of Division 23.

END OF SECTION 23 1100

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SECTION 23 2213 - STEAM AND CONDENSATE PIPING

PART 1 GENERAL

1.1 WORK INCLUDED

- A. The work governed by this Section includes the steam supply and condensate return piping systems, steam specialties and steam system equipment.

1.2 SUBMITTAL DATA

- A. See Section 23 0000 "General Provisions for Mechanical Work" for general submittal requirements.
- B. Provide manufacturer's literature for all products specified in this Section which will be installed under this project.
- C. Provide complete product data, installation instructions and performance data at scheduled conditions and project altitude for all condensate traps, gauges and accessories. See additional submittal requirements for traps elsewhere in this section.
- D. Provide complete information on all piping and fittings. Demonstrate compliance with the material and manufacturer requirements found hereinafter. Provide welder qualifications, and welding procedure specifications, in accordance with Section 23 1100 "General Requirements for Pipe and Pipe Fittings" and as noted herein.
- E. Note that piping assembled by welding and brazing shall be assembled only by those holding a current certification and meeting and validating the credentials outlined in Section 23 1100.

PART 2 PRODUCTS

2.1 PIPING

- A. Steam Piping
 - 1. Steam piping shall be constructed of ASTM A-106 type S or ASTM A-53 Type E black steel. Piping through 10" size shall be schedule 40.
 - 2. Except as listed below for select sizes and applications, fittings shall be steel butt welded fittings, ANSI B16.9, ASTM A234, Grade WPB, long turn ells, ANSI B16.5 weld-neck or slip-on forged carbon steel ANSI B16.5 flanges, except slip-on not acceptable for steam pressures above 15 psig. Weld-o-lets and thread-o-lets are acceptable for gauges and instrument fittings only. Flanges shall be class 150 with raised face. Fitting ratings shall be in accordance with system maximum working pressure ratings, ANSI B31.1 or B31.9 and of wall thickness not less than system piping.
 - 3. Except as listed below for select sizes and applications, assembly for steel piping shall be by butt welding to ANSI B31.1 including requirements for welding procedure specifications and qualifications records in accordance with ASME Section IX.
 - 4. Fittings for piping 2" and less in size may be socket weld fittings, ASTM A105, ANSI B16.11, wall thickness to match pipe and required system pressure ratings, Class 3000 minimum. Manufacturer to be ISO 9001 or equivalent and ISO 14001 or equivalent certified.
 - 5. Assembly for socket welded fittings shall be to ANSI B31.9 or ANSI B31.1 as required by application, including requirements for welding procedure specifications and qualifications records and weld inspection in conformance with ANSI B31.9 or B31.1. Maintain 1.6 mm clearance between pipe end and socket shoulder.
 - 6. For pipe sizes 2" and less, fittings may be welded as noted above or may be threaded. Threaded fittings shall be malleable iron ANSI B16.3 class 125. Fitting manufacturer shall be ISO 9001 certified and ISO 14001 certified or equivalent.
 - 7. Threaded fittings shall be malleable iron ANSI B16.3 Class 125.
 - 8. Threaded fittings shall utilize American Standard pipe threads, ANSI B2.1 with thread sealant or with Mil Spec 27730A AND AA58092 PTFE premium density tape. Pipe sealant shall be specially listed to be compatible with system contents, pipe materials and operating conditions.
- B. Steam Condensate Piping
 - 1. Gravity condensate piping shall be constructed of the same materials and methods as required for Steam Piping except shall be Schedule 80.
- C. Steam Vent Piping
 - 1. Steam vents shall be Schedule 40 steel pipe as specified above with any of the fittings and joint methods noted above for any pressure steam.

2.2 STEAM TRAPS

- A. Traps shall be Float and Thermostatic (F&T) type traps as indicated on the drawings and with the scheduled or noted capacity.
- B. Equivalent products of Sarco, Hoffman and Armstrong are acceptable. Other manufacturer's of equivalent products are not prohibited.
- C. Internal parts shall be made of stainless steel or special heat treated chrome steel.
- D. All trap bodies shall be tagged, stamped or labeled by the manufacturer with the trap identification number indicated on the plan schedules or with the identification number of the equipment each trap is intended to serve. Labeling of shipping boxes only is not acceptable.
- E. Unless exact trap model numbers and orifice sizes are scheduled or otherwise identified on the plans, it is the contractor's responsibility to provide steam traps appropriate and adequate in every respect for the system and application in which they are to be employed. The trap manufacturer's representative shall thoroughly familiarize himself with the plans and steam systems and shall select the appropriate trap models and orifice sizes for the trap series listed on the plan schedules.
- F. Trap submittal data shall be arranged in a schedule format. Cut sheets shall accompany the schedule for each trap and shall clearly identify the allowable operating differential pressure, the pressure rating of the trap body, the orifice size to be furnished and a capacity table for the selected orifice size of each trap. Submittals shall be rejected and revised until all data is complete and all traps are approved.

2.3 PRESSURE GAUGES

- A. Equivalent products of Trerice, U.S. Gauge, Palmer and Marshalltown are acceptable.
- B. Gauges shall be Trerice series 700SSLF, liquid filled, 4" face with stainless steel case, movement and socket, ASME B40.1 Grade 1A rated accuracy of 1% full scale, 0-60 psig range. Provide and mount with #885 coil siphon and #865L gauge cock.

2.4 GASKETS

- A. Gaskets for flanged fittings and valves shall be spiral wound metallic type, Flexitallic or approved equal, suitably rated for not less than 150% of system operating temperature and pressure.

2.5 AIR VENTS AND VACUUM BREAKERS

- A. Thermostatic air vents shall be pressure balanced thermostatic type with stainless steel bellows and seal, Sarco model VS-206 or approved equal. Pipe outlet to sump pit.
- B. Vacuum breakers shall be stainless steel constructed, Sarco model VB-14 or approved equal.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Pipe
 - 1. Slope steam and condensate down in direction of flow unless otherwise indicated on the drawings.
- B. Traps
 - 1. Install all traps with adequate dirt pocket and with trap far enough below coil to provide sufficient head for good drainage. Minimum trap arm height is 12".
 - 2. Install traps with strainer, unions and valves for maintenance. Where trap has internal strainer, also install external one. Provide check valves on downstream side of all traps that lift condensate.
- C. Gauges
 - 1. Install pressure gauges where indicated on drawings, complete with siphon tube and gauge cock.
- D. Air Vents and Vacuum Breakers
 - 1. Install all branch connections to the new cagewash unit with a thermostatic air vent and vacuum breaker upstream of unit connection. Pipe air vent discharge to the pit sump.

3.2 CLEANING

- A. Flush debris and residue from system with fresh water. Add and circulate a solution of water and trisodium phosphate heating to between 120F and 140F. After four hours, flush the system again and drain. Alternate cleaning solutions and methods shall be considered if requested by the contractor. Drain system after cleaning and contain and remove all drained cleaning fluid and dispose of legally offsite unless expressly allowed to dump on-site after approved written request to the

Project Manager. Test pH and repeat flushing as necessary until the same pH as the source water is achieved or to the satisfaction of the Project Manager.

- B. All traps and strainers shall be cleaned at the completion of the job. Any trap permitting steam to pass shall be replaced.
- C. All equipment shall also be cleaned on the exterior of any grease, plaster, paint spatter, etc.

3.3 TESTING

- A. The Contractor shall furnish all labor, required temporary piping and equipment for testing.
- B. Test Pressures
 - 1. Any item of equipment or device in the systems that is not designed for the test pressures listed shall be isolated from the system during testing.
 - 2. Steam and condensate piping tested at 100 psi hydrostatic pressure for a period of four hours and prove tight.
- C. Any damage occurring as a result of testing, leaks, etc., shall be corrected at this Contractor's expense, such as damaged insulation, painting, ceiling tile, flooring, plaster, etc., or piping or items in system damaged from being exposed to the test pressure.

END OF SECTION 23 2213

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SECTION 23 3113 - DUCTWORK AND ACCESSORIES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 WORK INCLUDED

- A. Furnish and install all sheet metal duct systems as indicated on the plans or herein described. Construct all ductwork to the noted SMACNA pressure class standards and seal all ductwork to the SMACNA seal class noted herein. Note that these ductwork and sealant classes may be more stringent than is typically recommended by SMACNA as it is highly important that duct leakage be held to a minimum in order to achieve proper, repeatable and sustained relative pressurization of spaces.
- B. Furnish and install all grilles, registers, diffusers, dampers and ductwork accessories as shown on the plan or herein described.

1.3 QUALITY ASSURANCE

- A. Duct construction shall be in accord with the requirements of the two following organizations and good industry practice.
 - 1. Various applicable manuals and standards of the Sheet Metal and Air Conditioning National Association (SMACNA).
 - 2. Material and duct construction standards of the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE).
 - 3. Where more stringent requirements are stated herein, they shall take precedence over SMACNA and ASHRAE standards.

1.4 CODES

- A. Materials, methods and installation shall also be in accord with the applicable requirements of the National Fire Protection Association (NFPA) Standards 90A and 90B and the 2018 International Mechanical Code.

1.5 SUBMITTAL DATA

- A. See Section 23 0000 "General Provisions for Mechanical Work" for general submittal requirements.
- B. Submit complete manufacturer's literature for all duct, duct fittings and duct accessories. Submit product data for sealants.
- C. Submit manufacturer's literature and performance data for all grilles, diffusers and registers. Identify all materials of construction and the options and accessories which will be furnished with each unit. Performance data shall include throw, pressure drop and NC information.
- D. Submit a report indicating ductwork has been visually examined for leakage and all leakage has been sealed or corrected.

PART 2 - PRODUCTS

2.1 ENVIRONMENTAL AIR DUCT SYSTEMS

- A. Square or rectangular ducts for HVAC systems and similar uses shall be constructed of G60 galvanized sheet steel unless otherwise specified hereinafter or noted on the drawings. Materials gauges (thickness) shall be in accordance with the SMACNA and ASHRAE standards listed above. If more stringent requirements are stated herein, then this specification shall govern.
 - 1. **All joints and seams of all ductwork and fittings shall be sealed essentially air tight.** Sealants shall be as specified herein or with an approved substitute product. All duct systems shall be constructed to 2" w.c. SMACNA pressure class, constructed of the listed materials, and have all joints and seams sealed. Duct systems, or portions thereof, so indicated on plans shall be constructed to higher pressure class standards than may be listed on the table. Minimum wall thickness for all galvanized rectangular ducts shall be 22-gauge unless a heavier minimum gauge is required by the listed SMACNA standards due to duct dimensions or pressure class or as listed on the table in this specification. Transverse joints and reinforcements shall be constructed, sized and spaced in accordance with SMACNA standards for the duct dimensions, wall thickness and pressure class of duct employed. Use only fitting, joint and reinforcement types that can be

sealed to the specified leakage rates (SMACNA CL3). Unless mandated by SMACNA tables or otherwise approved, **ducts shall be constructed without internal support rods. Coordinate joint and intermediate reinforcement methods with the mechanical insulation contractor** as insulation thickness is required to be continuous across joints, reinforcement shapes and braces. Match the height of joints and intermediate reinforcing shapes to the required insulation thickness to the greatest practicable extent so as to avoid odd geometry at joints and reinforcements. Additionally, select reinforcements (especially reinforcement shape height) and spacing to meet dimensional restrictions inside chases.

2. All supply, return and exhaust duct branch fittings shall be of a low loss design and shall feature a tapered inlet/outlet at the point of connection that is not less than 2" in length. Rectangular elbows shall be fitted with turning vanes. Unless otherwise approved, fittings shall be those with tabulated pressure drops as published by SMACNA or ASHRAE and shall not be makeshift in arrangement. Install and apply all duct mounted equipment as recommended by the manufacturer noting especially where upstream and downstream clearances must be maintained to attain tabulated pressure drops.

B. Round or Oval Spiral Galvanized Duct

1. Round or oval ducts and fittings shall be spiral type and manufactured by a company whose primary business is the manufacturing of these items.
2. Spiral seam round duct shall be fabricated from G60 galvanized steel meeting STM A-527 standards and guaranteed to meet SMACNA leakage class CL3. Gauges shall be the following minimums unless otherwise noted on plans or in specifications:

Diameter	Gauge
3" - 14"	26
3. Fittings shall be fabricated only with welded joints and constructed with mitered or formed sections. Ninety-degree elbows shall be provided with minimum 5-gore construction. Branch line tees shall be separate factory fabricated fittings with low loss design. Unless otherwise indicated on the plans, the centerline bend radius of all fittings and elbows shall not be less than one duct diameter. Adjustable elbows and fittings shall not be used.
4. Joining of ductwork shall utilize SMACNA fig. 3-2 style RT-1 beaded slip joint on ducts size 18" diameter and smaller or Ductmate - METU gasketed connector on ducts 12" diameter and smaller.
5. All branch duct fittings shall be of a low loss design and shall have radiused or tapered inlets. Attachments of duct mains to plenums, plug fan casings and air handling equipment casings shall be made using spun bellmouth fittings or other tapered entrance designs.

C. Duct Sealing

1. Except for fully welded joints, all fabricated joints and seams of ALL ductwork and fittings on the project shall be sealed air tight in accordance with SMACNA seal class "A". This requirement specifically includes low pressure duct systems as well as high pressure duct systems and joints of all types (i.e. transverse, radial, longitudinal). Joint sealing materials shall be as specified herein or an approved substitute product.
2. Sealant for indoor supply, return and exhaust air ductwork shall be water based vinyl acrylic such as "Iron-Grip 601" as manufactured by Hardcast, Inc., "Pro-Seal" by Ductmate, or approved equal. Sealants for outdoor ductwork and fresh air ductwork shall be indoor/outdoor rated such as Versa-Grip 181 by Hardcast, or approved equal, and shall have a shore a hardness greater than 20 and shall pass the ¼ inch mandrel bend test. All sealants shall be rated for up to 10" w.g. pressure class for SMACNA seal classes A, B and C and shall have a service temperature range of -20°F to 200°F.
3. **Sealant shall be applied to backpans and all system joints so that the entire system, up to the actual entry into each room itself, is fully sealed.**
4. Where indicated on the plans duct systems shall be joined with a flanged and gasketed system.

2.3 DUCT ACCESSORIES

- A. Equivalent products of Elgen, Young, Duro-Dyne or Ventfabrics and other qualified manufacturers are acceptable.
- B. Duct turning vanes - single vane with trailing edge as per SMACNA Fig. 2 3. Install at all ninety-degree rectangular elbows and elsewhere as shown on plans or details.
- C. Instrument Test Holes: See 2.4 Below.

- D. Volume dampers – Products by Ruskin, Cesco Products, Nailor Industries, Air Balance, Inc. or equivalent are acceptable. Without exception, whether furnished as a separate device or as part of a take-off fitting, volume dampers shall be constructed with continuous solid axles, shall have plastic or metallic axle bearings configured to minimize leakage at the axle shaft and shall be rated for 1,500 feet per minute velocity and 4” water gauge pressure class and shall have 2” standoff brackets on a locking quadrant actuator. Axle ends shall be permanently marked (field or factory) to indicate blade position. Volume dampers for rectangular ducts may be single blade for ducts 10” or less in height and multi-blade in opposed blade arrangement for taller ducts. It is the intention of this specification to require that dampers be high quality, durable and rigid, and have a low axle leakage rate.

2.4 INSTRUMENT TEST HOLES

- A. Instrument test holes shall be drilled holes with removable plastic plugs.

2.5 GRILLES, REGISTERS, DIFFUSERS

- A. Equivalent products of Titus, Krueger, Tuttle & Bailey, Carnes, Metal Aire, Nailor Industries, Anemostat, as noted on plans, or equivalent.
- B. All units shall be furnished and installed complete with the necessary accessories such as gaskets, frames, screws, key operators, for a satisfactory installation. All grilles which are to install directly to ceiling or gypsum wall board surfaces (without duct connections) are to be provided with mounting frames on the opposite side of the ceiling or wall surface.
- C. Sizes, materials, types and finishes shall be as noted in the schedules. Note, particularly, where airtight backpans may be required.

2.6 STAINLESS STEEL DUCTS AND HOODS

- A. The requirements of this paragraph apply to all ductwork noted hereinafter, noted elsewhere in specifications or noted on the drawings to be constructed of stainless steel.
- B. Stainless steel duct shall be fully welded, shall be constructed of 316L stainless steel and shall be minimum 18 gauge thickness regardless of SMACNA pressure class. All stainless steel duct shall be longitudinal seam type with fully welded joints and seams. Joints shall be butt welded, ground free of large sags or inconsistencies and cleaned. Lap welding shall not be used unless specifically allowed by the University following submittal of sample welds and written explanation of where they are intended to be used. Fittings shall be as noted above for environmental systems in terms of low loss design, turning vanes and other construction features. Accessories and ancillaries in stainless steel ducts shall be constructed of the same grade of stainless steel as the duct unless otherwise approved.
- C. Negative pressure ductwork associated with the Cagewash system exhaust fan shall be constructed to 2” w.c. standards with a minimum wall thickness of 20 gauge. Any exposed ductwork in the occupied spaces shall have welds ground smooth and polished.
- D. Hoods shall be constructed the same as ductwork with all welds ground smooth and polished.
- E. Duct accessories installed in a stainless steel duct system shall also be constructed of the same or higher grade of stainless steel as the duct. This includes balance and control dampers, flexible connections, turning vanes, access doors. Consult engineer if such items cannot be constructed completely of stainless steel.

PART 3 EXECUTION - ENVIRONMENTAL AIR DUCTS AND ACCESSORIES

3.1 INSTALLATION

- A. Fabricate and install all ductwork and fittings generally in accord with the applicable SMACNA Manual or ASHRAE Guide. Carefully select joint, reinforcement and fastener types to insure specified leakage rates can be attained, ducts will fit in space allotted and that standing reinforcement is compatible with insulation thickness and type. Adequately support duct systems with sheet metal strap, strap irons or rods as required, fastened securely to the duct and to building construction.
- B. Joints shall be mechanically secure and airtight. Joints, seams and other possible leakage areas shall be sealed with sealants specified above. It is the intent to have no air leakage out of the duct systems.
- C. Turning vanes shall be installed at all 90 degree elbows in rectangular ducts and elsewhere as indicated or depicted on plans or details.

- D. All dampers shall operate smoothly through their entire range. Provide locking mechanisms with standoff brackets on all manual balancing dampers to secure dampers in position. Dampers with frames installed within ductwork shall be sealed to the ductwork so that no gaps exist between duct wall and damper frame. Install sheet metal angles on the downstream side of damper frame perimeter to secure damper in duct should the damper actuator slip or unintentionally close the damper against airflow.
- E. Tapping connectors for round duct connections shall be high efficiency takeoffs with tapered design unless otherwise noted on plans. Connectors for branch ducts which attach to main duct runs shall be fitted with volume dampers. Note volume damper construction requirements and provide separate damper where required to meet specifications.
- F. Wall and Floor Penetrations
 - 1. Seal all penetrations in walls and soffits using industrial grade elastomeric sealant.
 - 2. All penetrations shall be sealed air-tight using caulks and products specified in Division 7.
- G. Grilles, Registers, Diffusers (GRD's)
 - 1. Set flush, level and plumb, tight to floor, wall or duct. Use gaskets or plaster frames on all grilles and registers for sealing against floors, walls, ceilings or exposed duct.
 - 2. Diffusers/Grilles which are mounted to wall or ceiling surfaces shall be secured through the ceiling or wall to a suitable frame on the opposite (back) of the mounting surface. Ducts shall not impose weight on GRD's nor shall GRD's be supported by the ductwork. Ceiling diffusers shall be supported from the ceiling support system or from the structure above (support from ceiling tile will not be acceptable).
 - 3. Seal all backpans and duct connections to GRD's so that they are airtight. Coordinate insulation of backpans and connectors with the insulator so that sealant is applied prior to insulation.

3.2 CAGE WASHER EXHAUST DUCTS

- A. Slope ducts continuously back towards machine with no depressions or low spots. Notify Engineer if this is not possible due to obstructions.
- B. Rigidly brace all exhaust duct systems. Make connections to cagewasher, hoods and other equipment air-tight.
- C. Clean all duct sections inside and out as they are installed and keep all openings sealed closed during construction.
- D. Inspect all joints, seams, connections to fans and equipment for leakage and repair all visible leaks prior to leak testing.

3.3 TESTING, BALANCING, CLEANING OF DUCT SYSTEMS

- A. Testing of all ductwork except as noted elsewhere in the Section.
 - 1. The building duct systems (supply, return, fresh air, and exhaust, etc.) shall be statically leak tested. Testing procedures shall follow the SMACNA "HVAC Air Duct Leakage Manual" and as listed herein and shall be performed before any external insulation is applied. Each joint and seam shall be inspected.
 - 2. All dampers shall be checked for smoothness of operation. Repair unacceptable units to the satisfaction of the Engineer. Examine damper installation and insure damper frames are sealed airtight to ductwork.
 - 3. The Contractor shall operate all dampers after installation to ensure that operation is correct and that service access is adequate.
 - 4. Any portion of ductwork which indicates 'oil canning' or deformation due to duct pressures shall be additionally reinforced.
 - 5. The Contractor shall schedule and coordinate all testing with the Engineer and Project Officer.
- B. Balancing
 - 1. See Section 23 0593 "Testing, Adjusting and Balancing".
 - 2. The system, shall be balanced to the airflow indicated on the drawings and/or specified elsewhere and, equally important, to maintain appropriate relative pressurization of the 'clean' and 'dirty' sides of the cagewash area and adjacent spaces.
 - 3. Balancing is to include adjusting and/or replacing sheaves, pulleys, belts, motor speeds, etc., to deliver the listed airflows. Set all dampers and make all necessary adjustments.
 - 4. The Mechanical Contractor shall provide full cooperation to the Test and Balance Contractor during construction and throughout the test and balance procedure, and throughout system startup and testing procedures.

5. Participate on a full time basis in test and balance activities of the cagewash areas to insure that airflow orientations are constant and do not reverse during equipment cycles.
- C. Cleaning
1. All equipment, plenums, ducts, grilles and registers, hoods and component parts of all duct systems shall be clean and free of dirt, stickers, markings and debris on both the inside and outside of all components. Cleaning methods shall consist of sweeping, vacuuming, washing, etc., as necessary to establish clean conditions.

3.4 LEAKAGE TESTING OF DUCT SYSTEMS

- A. Testing Requirements
1. Ductwork is not required to be leak tested but is required to be visually inspected for leakage as noted hereinafter.
- B. Inspection and Sealing of Low Pressure Duct
1. All ductwork, regardless of type or operating pressure, shall be sealed to SMACNA class A. All joints and seams shall be sealed using the specified sealants or approved equivalents. Duct that is not required to be leak tested shall be visually inspected in its entirety prior to installation of any insulation to ensure that all joints and seams are sealed the same as for the tested ductwork.
 2. Any gaps and holes shall be thoroughly sealed prior to insulation.
 3. Submit a report verifying that the contractor has visually inspected all low pressure duct for proper sealant application. Include the name and signature of the person or persons who accomplished the inspections.

END OF SECTION 23 3113

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SECTION 23 3400 - FANS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Division 1 Specification Sections, apply to this Section.

1.2 WORK INCLUDED

- A. This Section governs the materials, installation, sheave alignment and belt tensioning of unitary fans.
- B. Prior to fan balancing activities and field alignment, provide drive changes for belt-driven fans as required to achieve final balance conditions at no additional cost to the Owner.

1.3 SUBMITTAL DATA

- A. See Section 23 0000 "General Provisions for Mechanical Work" for general submittal requirements. Provide manufacturer's literature for all products specified in this Section which will be installed under this project.
- B. Submit complete dimensional data, material type and thickness and equipment weights for all products governed by this Section.
- C. Submit unit ratings and performance curves specific to each fan to be supplied. Plot the specified point of operation on the curve for each fan. Fan data shall be corrected for the altitude of this project site.
- D. Submit complete drive sheave and belt information, including belt manufacturers' tensioning recommendations, to demonstrate compliance with the drive design requirements stated in paragraph 2.5, below.
- E. Submit complete factory balancing information to demonstrate compliance with the requirements stated in paragraph 2.6, below.
- F. Following completion of aligning, balancing and belt tensioning, submit complete results of these procedures and include the approved submittal in the operations and maintenance manuals.

PART 2 PRODUCTS

2.1 QUALITY ASSURANCE

- A. Equivalent products of ACME, Greenheck, Aerovent, Loren Cook and Twin City Blower are acceptable. No manufacturer is excluded provided their products are proven to be equal through the submittal process. See Section 23 0000 "General Provisions for Mechanical Work" regarding substitutions.
- B. Substitute units shall be of same type, class, size, etc., of specified units. The airflow and rpm of substitute fans shall be within 5% of the specified units for the specified static resistance. Noise level ratings shall be comparable to that of the specified unit. Construction features **and temperature ratings** of substitute fans shall be equivalent to those of scheduled products in every respect.
- C. Refer to the drawing schedules for fan size, type and performance, and required fan accessories. Units shall be supplied complete in all respects.

2.2 CONSTRUCTION

- A. It is imperative that fans provided under this project are rated for use with air saturated with water vapor and at temperatures that may, momentarily, reach 180F and can reach 160F on a sustained basis.

2.3 ROOF VENTILATORS

- A. Roof ventilators shall be provided with birdscreens, backdraft dampers and electrical disconnect switches mounted on the housing.

2.4 MOTOR PROTECTION

- A. All fractional horsepower (less than 1 hp) single-phase motors shall be provided with thermal overload protection.

2.5 BELT-DRIVEN FANS

- A. Fans with motor larger than 2 hp shall be fitted with fixed pitch sheaves with "QD" style bushings. Variable pitch sheaves may be used for balancing purposes and shall be replaced with fixed pitch

sheaves prior to final testing and balancing. The contractor shall provide and install all required sets of sheaves and belts for each fan to accomplish proper balancing as dictated by actual system operating requirements.

- B. If not specifically scheduled otherwise, belts shall be cogged design with standard width. The minimum size designation for belts on any fan shall be type 'BX'. **Drive systems shall be rated for not less than two times** the installed motor horsepower of the fan.

2.6 FACTORY BALANCING AND RUN TESTING

- A. The fan wheels of all scroll fans and plenum fans with motors 2 hp and over shall be statically and dynamically factory balanced on precision electronic balancers to a Balance Quality Grade G6.3 per ANSI/AMCA 204 or better.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install units as noted and shown on the drawings and in strict accord with manufacturer's recommendations.
- B. Before being placed into final service, all fans shall be lubricated and checked for proper mounting, fan wheel balance and proper adjustment and alignment of bearings, belts, and drives.
- C. It is this Contractor's responsibility to provide proper size openings, roof curbs, and mounting provisions as necessary for proper installation of the fans. Roof curbs shall fit snugly to fan skirt.
- D. Place a layer of resilient insulation between the fan base and curb on roof-mounted fans.
- E. Roof fans shall be fastened to the roof curb with lag screws, minimum of 2 per side.

3.2 SHEAVE ALIGNMENT AND BELT TENSIONING

- A. This contractor shall be responsible for final alignment of sheaves and for belt tightening. Final alignment shall be performed after air balance procedures (see Section 230593) have been performed.
- B. Sheave alignment and belt tensioning shall be witnessed at the discretion of and by the Project Manager. Give Owner's Representative 2 days notice (minimum) of scheduled sheave alignment and belt tensioning.
- C. Prior to performing final sheave alignment, measure sheave run out both radial and axial. The tolerance for radial run out should not exceed 5 mils total indicated reading (TIR) on high speed sheaves (1,800 rpm or greater). The tolerance for axial run out should not exceed 0.5 mils/inch of sheave diameter TIR for high speed sheaves. Always follow the sheave or machine manufacturer's tighter tolerance recommendations.
- D. Sheave alignment:
 - 1. shall be performed by a qualified technician experienced in sheave alignment and belt tensioning.
 - 2. shall be performed with a laser beam which projects a laser fan line on to 3 targets attached on the other pulley(s).
 - 3. See Table 1, below, for sheave alignment tolerances.

TABLE 1 Sheave Alignment Tolerances

Offset rpm	Excellent		Acceptable	
	mils	mm	mils	mm
0000-1000	3.0	0.07	5.0	0.13
1000-2000	2.0	0.05	4.0	0.10
2000-3000	1.5	0.03	3.0	0.07
3000-4000	1.0	0.02	2.0	0.04
4000-5000	0.5	0.02	1.5	0.03
5000-6000	<0.5	<0.01	<1.5	<0.03

TABLE 1 Sheave Alignment Tolerances (cont)

Angular Error				
rpm	mils/"	mm/100	mils/"	mm/100
0000-1000	0.6	0.06	1.0	0.10
1000-2000	0.5	0.05	0.8	0.08
2000-3000	0.4	0.04	0.7	0.07
3000-4000	0.3	0.03	0.6	0.06
4000-5000	0.2	0.02	0.5	0.05
5000-6000	0.1	0.01	0.4	0.04

E. Belt Tensioning:

1. Ensure belts for the specific equipment being adjusted are a matched set. Belt(s) shall be tensioned until the force required for proper deflection, as measured with a spring scale, equals the belt manufacturer's maximum recommended force values for the specific belts. The force value for all belts for the fan being adjusted should fall within 10% of each other.
2. Monitor sheave alignment during belt tensioning as described above and adjust as required.
3. Run the fan for approximately 2 hours to allow the belts to stretch and properly seat in the sheave grooves. Re-tension the belts to the recommended values.
4. Run the fan for 72 to 96 hours. Re-tension to the manufacturer's recommended force values for used belts.

3.3 TESTING, BALANCING, CLEANING

A. Testing

1. This Contractor shall furnish all labor and materials for testing.
2. Each unit shall be tested during normal system operation after all balancing is complete. Any excessive noise indicating loose belts, bad bearings, etc., shall be corrected.

B. Balancing

1. Unit balancing shall be accomplished in conjunction with the air distribution system balancing. See Section 23 0593 "Testing, Adjusting and Balancing".
2. The Contractor shall provide drive changes or replacement sheaves and belts as necessary to balance all units to the specified airflow.

C. Cleaning

1. Clean all equipment inside and out.

END OF SECTION 23 3400

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DIVISION 26 - ELECTRICAL

SECTION 26 0000 - GENERAL PROVISIONS FOR ELECTRICAL WORK

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 BIDDING

- A. The Contractor shall provide labor, materials, equipment, items, articles, operations, and methods listed, shown, scheduled, or mentioned on the drawings, and/or specified, including all incidentals required for their completion.
- B. The Contractor shall refer to the General part of these specifications, such as Instructions to Bidders, Special Conditions and DIVISION 01 for restrictions covering time that work can be performed in certain areas, noisy and dusty operations, sequence of work, access to restricted areas and similar types of work and operations.

1.3 SUBSTITUTIONS

- A. Most items in this DIVISION are eligible for substitution in accordance with the General Conditions and Supplements hereto. Where a proprietary specification is written for a particular item, then only that item may be used. The final decision as to acceptability rests with the Engineer.
- B. When the Engineer deems it necessary to assure satisfactory installation and compatibility with other equipment, piping, ductwork, electrical provisions and other appurtenances, the Contractor shall prepare scale drawings of the substitute item showing proposed location, connections, relation to other equipment and other pertinent data such as maintenance space requirements, electrical requirements, height and weight. Drawings must receive Engineer's approval before the substitution is made.
- C. It is the Contractor's responsibility that the substitute item shall fit into the space allocated and that the item can be installed and function as intended. Should changes in the work of any Contractor become necessary as a result of any substitute item under this DIVISION, such changes shall be arranged and paid for by this Contractor.
- D. Capacities of substitute items shall not be less than that of the specified item.
- E. The performance of the factory representative and supplier on past work will be a consideration in the approval process of substitute items.

1.4 CODES, REGULATIONS AND PERMITS

- A. All materials and equipment shall be new, approved by Underwriters' Laboratories, Inc., Factory Mutual Research Corporation or other nationally recognized testing organization or by the local inspection authority, and be in new, undamaged condition when installed.
- B. All materials and equipment shall comply with the National Electrical Code, National Electrical Safety Code, Uniform Building Code, and all other applicable Federal, State, City and County codes, regulations and ordinances.
- C. The Contractor must obtain and arrange for all permits and approvals required for the execution of the work.

1.5 INTENT OF DRAWINGS

- A. Riser diagrams and other diagrams are schematic only and not to scale. They are intended only to indicate sizes or relative arrangement of conduit and equipment shown elsewhere in plan view.
- B. The drawings and specifications are intended to supplement each other and any details contained in one and not the other shall be included as if contained in both. Items not specifically mentioned in the specifications or noted on the drawings, but which are necessary to make a complete working installation shall be included.

1.6 WORKMANSHIP

- A. Work to be accomplished by workmen skilled in the particular trade, in conformance with best practices and to meet all applicable codes.
- B. Owner's representative decides when work is satisfactory. Contractor shall replace materials or equipment not properly installed or finished, without an increase in cost.

1.7 RESPONSIBILITY

- A. The Contractor is responsible for installation of satisfactory and complete piece of work in accordance with true intent of drawings and specifications.
- B. Consult all drawings for project to predetermine that work and equipment will fit as planned.
- C. Location of conduit, panels, outlets, equipment, switches, etc., checked to determine it clears openings, structural members, cabinets, heating units, ducts, piping, telephone equipment and equipment having fixed locations. This check-out done prior to rough-in.
- D. If, at any time, and in case, change in location of conduit, outlets fixtures, switches, panels, equipment, etc., become necessary due to obstacles or installation of other trades shown on any of the project drawings, such required changes made by Contractor at no extra cost.
- E. By the act of submitting a bid, this Contractor shall be deemed to have:
 - 1. Examined all drawings and specifications which are a part of this project.
 - 2. Made proper allowances for coordination with other trades and the Government.
 - 3. Provided for the requirement to work with other contractors.
 - 4. Considered the complexity, scheduling and all other special and unusual circumstances involved which this Contractor has determined to be connected with this project.
 - 5. Make an affirmative statement that this Contractor has read the documents, he understands their meaning and intent, he is able to install the work in the manner shown and satisfactory to the Engineer and that he is willing and able to execute the work of this Division 16 in accordance with the requirements, restrictions and limitations stated or implied in these construction documents.

1.8 DELIVERY AND STORAGE OF MATERIALS

- A. Make provisions acceptable to the Owner's representative for delivery and storage of materials. Materials shall not be stored within the building unless specifically authorized by Owner's representative.
- B. Make provisions for introduction into the building of equipment furnished under this DIVISION.

1.9 MANUFACTURER'S DIRECTIONS

- A. Manufactured materials and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned as directed by manufacturer unless noted otherwise herein or on the drawings.

1.10 CUTTING, PATCHING, REPAIRING

- A. Cutting, patching and repairing required by the work of this DIVISION shall be the responsibility of this Contractor.
- B. Work shall be performed in accordance with DIVISION 1, GENERAL REQUIREMENTS, of these specifications.
- C. The performance of this work shall not weaken the structural integrity of the building.
- D. Any abrasion or disfigurement of the finished work or any portion of the building where any such abrasion or disfigurement is caused by the activities of the contractor shall be repaired, and neatly refinished to match the adjacent work.

1.11 OPENINGS IN RACEWAYS AND BOXES

- A. Openings in conduit, boxes, etc., kept closed during progress of work.
- B. The Contractor required to clean new systems found dirty to satisfaction of the Owner's representative at no additional cost.

1.12 CLEANUP

- A. Upon completion of daily work (or more often if necessary), remove materials, scraps, etc., relative to this work and leave premises in clean and orderly condition. Any work which creates dust or dirt shall be performed with a shop type vacuum cleaner so as to prevent any dust or dirt contamination of the space and switch or equipment. This includes drilling of holes for equipment installation.
- B. Clean equipment of dirt and debris, including panelboards, disconnects, outlet boxes, lighting fixtures, and fixture lenses.

1.13 SAMPLES

- A. The Contractor shall submit actual production samples on any material or equipment requested if, in the Engineer's opinion, it is necessary in order to determine the quality, workmanship, operation, etc., of the item.
- B. Samples will be returned to the Contractor. Approved samples may be used on the job.
- C. Costs incurred in providing and returning samples will be the responsibility of the Contractor.

1.14 TEMPORARY SERVICES

- A. See DIVISION 1 - GENERAL REQUIREMENTS for Temporary Facilities.

1.15 FIRE PROTECTION

- A. Raceway penetrations of all fire partitions, walls and floors shall be effectively fire-stopped to equal the fire rating of the floor or partition using materials and methods UL approved and tested to meet all conditions of ASTM E 119, UL 1479 and ASTM E 814 tests. One such material is Carborundum bulk "Fiberfrax" fiber packing for filling the annular space between pipe and sleeve or hole and Fiberfrax LDS moldable caulking for sealing in the fiber packing. Other acceptable materials are Dow Corning 3-6548 Silicon RTV foam firestop system, General Electric 'Pensil' 851 system or U.S.G. fire code compound and Thermafire.
- B. Construction of permanent bracing, framing, roof curbs and platforms or other structures which utilize wood construction shall be fabricated from fire resistant treated materials or shall be otherwise protected by approved fire-resistant materials.

1.16 EQUIPMENT MOUNTING

- A. Floor Mounting
 - 1. Concrete bases 4" high with chamfered edges shall be provided under floor-mounted equipment such as switchboards, transformers, and motor control centers where bases are called out or indicated on the drawings.
 - 2. Floor-mounted equipment shall be secured to the concrete bases with steel anchor bolts preset in the concrete base. Anchor bolts and anchoring shall be capable of resisting horizontal and vertical earthquake forces as required in the Uniform Building Code, Section 2312. Where spring-type vibration mounts are required, they shall be secured to the concrete bases and, in addition, the equipment restrained whereby the equipment is free to vibrate but cannot move from the base.
- B. Wall Mounting
 - 1. Wall-mounted equipment, such as panelboards, shall be securely fastened to the wall using appropriate fasteners such as toggle bolts, expansion bolts, etc.

1.17 COMPLETION AND TESTS

- A. Complete and test each system and leave in proper operation.
- B. At the time of finalizing the Project, a completion system test shall be performed in the presence of the owner's designated representative. During the test, the contractor shall demonstrate that the systems perform in the manner described in the specifications and indicated on the drawings. Test procedure and the results shall be recorded and delivered to the Owner's representative. Tests shall be repeated after any corrections are made as a result of initial testing or correctional work under guarantee provisions.

1.18 OPERATING INSTRUCTIONS

- A. The Contractor shall provide qualified personnel to instruct the Owner's maintenance people in the operation and maintenance of the system.
- B. Written operation and maintenance instructions, as produced by the manufacturer, shall be provided for all equipment. These instructions shall be bound and submitted as described in Part 2, below.

1.19 REMODELING WORK

- A. Wherever existing electrical wire, conduit, controls, circuits, etc., are cut into, removed, interrupted, as a result of the remodeling, all such items that serve areas or equipment that remain shall be rerouted, extended, relocated, etc., as necessary to maintain operation of equipment and services.
- B. Downtime shall be held to a minimum. Outages shall be scheduled at a time acceptable to and approved by the Owner. Consult with Owner in sufficient time for him to make necessary preparations for the outage.
- C. Demolition
 - 1. Refer to the drawings for execution of demolition.
 - 2. All existing equipment and material removed and not scheduled for reinstallation shall remain the property of the Owner and shall be delivered to a designated stockpile area on the site by the Contractor. Materials not wanted by the Owner shall be removed from the site by the Contractor.
- D. Asbestos Awareness

1. If suspect asbestos materials are encountered, the contractor shall cease work in that area and inform the owner of his suspicions and will not proceed with work until such time that a determination can be made on how to proceed.

1.20 SITE INVESTIGATION

- A. The Contractor shall be cognizant that this is a remodeling project and as such, certain items cannot be fully illustrated nor explained without field observation. Therefore, before submitting his proposal, the Contractor should examine the site and building as it pertains to this Project and make allowances in this proposal for all conditions that will affect the work indicated in the Project manual and contract documents.

1.21 RECORD DRAWINGS

- A. Maintain a separate set of electrical drawings at the job site at all times to be used as record drawings. This set shall be kept up to date with all changes and/or additions in the construction and/or electrical systems, and shall be delivered to the Owner's representative at the completion of this job. This set of drawings shall be kept clean and protected at all times.

PART 2 SUBMITTALS AND OPERATION AND MAINTENANCE MANUAL

2.1 GENERAL

- A. Refer to Section 013000 for Submittal and Shop Drawing requirements.
- B. Refer to Section 017823 for Operation and Maintenance Manual requirements.

END OF SECTION 26 0000

SECTION 26 0519 - POWER CONDUCTORS AND CABLES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Building wires and cables rated 600 V and less.
 - 2. Connectors, splices, and terminations rated 600 V and less.

1.3 ACTION SUBMITTALS

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

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency.
- B. Field quality-control test reports.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a member company of the International Electrical Testing Association or is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.
 - 1. Testing Agency's Field Supervisor: Person currently certified by the International Electrical Testing Association or the National Institute for Certification in Engineering Technologies to supervise on-site testing specified in Part 3.
- 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.
- C. Comply with NFPA 70.

PART 2 PRODUCTS

2.1 CONDUCTORS AND CABLES

- A. Copper Conductors: Comply with NEMA WC 70.
- B. Conductor Insulation: Comply with NEMA WC 70 for Types THW, THHN/THWN, XHHW, UF, USE and SO.

2.2 CONNECTORS AND SPLICES

- A. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.
- B. Cable size #6 or larger shall use lugs or approved connectors.
- C. Conductors #8 and smaller, use solderless connector similar to Ideal Industries 'Wing Nut' twist on connector.

PART 3 EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

- A. Feeders: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
- B. Branch Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

- A. Type THHN-THWN, single conductors in raceway.
- B. Type MC prewired flexible metallic cable shall not be permitted, except for light fixture whips, not to exceed 6 feet in length.

3.3 IDENTIFICATION OF CONDUCTORS

A. Color Code conductors with the following table.

SYSTEM VOLTAGE	ØA	ØB	ØC	Neutral	Ground
120/208 Wye	Black	Red	Blue	White	Green
277/480 Wye	Brown	Orange	Yellow	Gray	Green

B. Circuits run and numbered to agree with drawings. Combining of circuits other than what is shown on the drawings is not acceptable with approval.

3.4 INSTALLATION OF CONDUCTORS AND CABLES

- A. Splices in new feeders not permitted. Splices in existing feeders allowed, when indicated on drawings.
- B. Conceal cables in finished walls, ceilings, and floors, unless otherwise indicated.
- C. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
- E. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.
- F. Support cables according to Division 26 Section "Hangers and Supports for Electrical Systems."
- G. Identify and color-code conductors and cables according to Division 26 Section "Identification for Electrical Systems."

3.5 CONNECTIONS

- A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.
- B. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
 - 1. Use oxide inhibitor in each splice and tap conductor for aluminum conductors.
- C. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches of slack.

3.6 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Division 26 Section "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.7 FIRESTOPPING

- A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according to Division 07 Section "Penetration Firestopping."

3.8 FIELD QUALITY CONTROL

- A. Perform tests and inspections and prepare test reports.
- B. Tests and Inspections:
 - 1. After installing conductors and cables and before electrical circuitry has been energized, Perform an insulation resistance test on all feeder conductors installed under this contract, including neutrals, using a megohmmeter. Apply 1,000 volts DC to each conductor and maintain for one minute. Minimum value for each conductor shall be 100 megohms at 60 degrees F. Insulation test is to be made between conductors and between conductors and ground.
- C. Test Reports: Prepare a written report to record the following:
 - 1. Test procedures used.
 - 2. Test results that comply with requirements.
 - 3. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.
- D. Remove and replace failed conductors and retest as specified above.

END OF SECTION 26 0519

SECTION 26 0529 - HANGERS AND SUPPORTS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 1. Hangers and supports for electrical equipment and systems.
 2. Construction requirements for concrete bases.

1.3 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design supports for multiple raceways, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.
- C. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
- D. Rated Strength: Adequate in tension, shear, and pullout force to resist maximum loads calculated or imposed for this Project, with a minimum structural safety factor of five times the applied force.

1.4 ACTION SUBMITTALS

- A. Product Data: For the following:
 1. Steel slotted support systems.
 2. Nonmetallic slotted support systems.
- B. Shop Drawings. Show fabrication and installation details and include calculations for the following:
 1. Trapeze hangers. Include Product Data for components.
 2. Steel slotted channel systems. Include Product Data for components.
 3. Nonmetallic slotted channel systems. Include Product Data for components.
 4. Equipment supports.

1.5 QUALITY ASSURANCE

- A. Comply with NFPA 70.

1.6 COORDINATION

- A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 03.

PART 2 PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

- A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.
 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Allied Tube & Conduit.
 - b. Cooper B-Line, Inc.; a division of Cooper Industries.
 - c. ERICO International Corporation.
 - d. GS Metals Corp.
 - e. Thomas & Betts Corporation.
 - f. Unistrut; Tyco International, Ltd.
 2. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
 3. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
 4. Channel Dimensions: Selected for applicable load criteria.
- B. Raceway and Cable Supports: As described in NECA 1 and NECA 101.
- C. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.

- D. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for non-armored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be malleable iron.
- E. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
- F. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
 - 1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
 - a. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1) Hilti Inc.
 - 2) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
 - 3) MKT Fastening, LLC.
 - 4) Simpson Strong-Tie Co., Inc.; Masterset Fastening Systems Unit.
 - 2. Mechanical-Expansion Anchors: Insert-wedge-type, stainless steel, for use in hardened portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.
 - a. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1) Cooper B-Line, Inc.; a division of Cooper Industries.
 - 2) Empire Tool and Manufacturing Co., Inc.
 - 3) Hilti Inc.
 - 4) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
 - 5) MKT Fastening, LLC.
 - 3. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.
 - 4. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
 - 5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
 - 6. Toggle Bolts: All-steel springhead type.
 - 7. Hanger Rods: Threaded steel.

PART 3 EXECUTION

3.1 APPLICATION

- A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.
- B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT, IMC, and RMC as required by NFPA 70. Minimum rod size shall be 1/4 inch) in diameter.

3.2 SUPPORT INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.
- B. Raceway Support Methods: In addition to methods described in NECA 1, raceways may be supported by openings through structure members, as permitted in NFPA 70.
- C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb.
- D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
 - 1. To Wood: Fasten with lag screws or through bolts.
 - 2. To New Concrete: Bolt to concrete inserts.
 - 3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
 - 4. To Existing Concrete: Expansion anchor fasteners.

5. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches thick.
 6. To Light Steel: Sheet metal screws.
 7. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate by means that meet seismic-restraint strength and anchorage requirements.
- E. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

3.3 CONCRETE BASES

- A. Construct concrete bases of dimensions indicated but not less than 4 inches larger in both directions than supported unit, and so anchors will be a minimum of 10 bolt diameters from edge of the base.
- B. Use 3000-psi 28-day compressive-strength concrete. Concrete materials, reinforcement, and placement requirements are specified in Division 03
- C. Anchor equipment to concrete base.
 1. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 2. Install anchor bolts to elevations required for proper attachment to supported equipment.
 3. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

3.4 PAINTING

- A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
- B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 26 0529

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SECTION 26 0533 - RACEWAYS AND BOXES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Metal conduits, tubing, and fittings.
 - 2. Nonmetal conduits, tubing, and fittings.
 - 3. Metal wireways and auxiliary gutters.
 - 4. Nonmetal wireways and auxiliary gutters.
 - 5. Surface raceways.
 - 6. Boxes, enclosures, and cabinets.
 - 7. Handholes and boxes for exterior underground cabling.
- B. Related Requirements:
 - 1. Division 26 Section "Underground Ducts and Raceways for Electrical Systems" for exterior ductbanks, manholes, and underground utility construction.
 - 2. Division 27 Section "Pathways for Communications Systems" for conduits, wireways, surface pathways, innerduct, boxes, faceplate adapters, enclosures, cabinets, and handholes serving communications systems.
 - 3. Division 28 Section "Pathways for Electronic Safety and Security" for conduits, surface pathways, innerduct, boxes, and faceplate adapters serving electronic safety and security.

1.3 DEFINITIONS

- A. ARC: Aluminum rigid conduit.
- B. GRC: Galvanized rigid steel conduit.
- C. IMC: Intermediate metal conduit.

1.4 ACTION SUBMITTALS

- A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.
- B. Shop Drawings: For custom enclosures and cabinets. Include plans, elevations, sections, and attachment details.

PART 2 PRODUCTS

2.1 METAL CONDUITS, TUBING, AND FITTINGS

- A. Listing and Labeling: Metal conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. GRC: Comply with ANSI C80.1 and UL 6.
- C. ARC: Comply with ANSI C80.5 and UL 6A.
- D. IMC: Comply with ANSI C80.6 and UL 1242.
- E. PVC-Coated Steel Conduit: PVC-coated rigid steel conduit.
 - 1. Comply with NEMA RN 1.
 - 2. Coating Thickness: 0.040 inch minimum.
- F. EMT: Comply with ANSI C80.3 and UL 797.
- G. FMC: Comply with UL 1; zinc-coated steel
- H. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.
- I. Fittings for Metal Conduit: Comply with NEMA FB 1 and UL 514B.
 - 1. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 886 and NFPA 70.
 - 2. Fittings for EMT:
 - a. Material: Steel
 - b. Type: Setscrew or compression.
 - c. Connectors shall be watertight in wet location and concrete tight in concrete and masonry.
 - 3. Expansion Fittings: PVC or steel to match conduit type, complying with UL 651, rated for environmental conditions where installed, and including flexible external bonding jumper.

4. Coating for Fittings for PVC-Coated Conduit: Minimum thickness of 0.040 inch, with overlapping sleeves protecting threaded joints.
- J. Joint Compound for IMC, GRC, or ARC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

2.2 NONMETALLIC CONDUITS, TUBING, AND FITTINGS

- A. Listing and Labeling: Nonmetallic conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Provide insulated bushings type B, SB or SBT as required.
- C. ENT: Comply with NEMA TC 13 and UL 1653.
- D. RNC: Type EPC-40-PVC complying with NEMA TC 2 and UL 651 unless otherwise indicated.
- E. LFNC: Comply with UL 1660.
- F. Rigid HDPE: Comply with UL 651A.
- G. Continuous HDPE: Comply with UL 651B.
- H. Coilable HDPE: Preassembled with conductors or cables, and complying with ASTM D 3485.
- I. RTRC: Comply with UL 1684A and NEMA TC 14.
- J. Fittings for ENT and RNC: Comply with NEMA TC 3; match to conduit or tubing type and material.
- K. Fittings for LFNC: Comply with UL 514B.
- L. Solvent cements and adhesive primers shall have a VOC content of 510 and 550 g/L or less, respectively, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- M. Solvent cements and adhesive primers shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.3 METAL WIREWAYS AND AUXILIARY GUTTERS

- A. Description: Sheet metal, complying with UL 870 and NEMA 250, NEMA type per drawings or as required by area being installed. Size according to NFPA 70.
 1. Metal wireways installed outdoors shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Fittings and Accessories: Include covers, couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.
- C. Wireway Covers: Screw-cover type unless otherwise indicated.
- D. Finish: Manufacturer's standard enamel finish.

2.4 SURFACE RACEWAYS

- A. Listing and Labeling: Surface raceways and tele-power poles shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Surface Metal Raceways: Galvanized steel with snap-on covers complying with UL 5. Prime coated, ready for field painting.
 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Hubbell.
 - b. Wiremold / Legrand.
 - c. Tele-Power Poles:

1. Provide poles as specified on drawings.
2. Fittings and Accessories: Dividers, end caps, covers, cutouts, wiring harnesses, devices, mounting materials, and other fittings shall match and mate with tele-power pole as required for complete system.

2.5 BOXES, ENCLOSURES, AND CABINETS

- A. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.
- B. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.
- C. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, aluminum, Type FD, with gasketed cover.
- D. Metal Floor Boxes:
 1. Material: Cast metal or sheet metal.
 2. Type: Fully adjustable.
 3. Shape: Rectangular.
 4. Listing and Labeling: Metal floor boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- E. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
- F. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, galvanized, cast iron with gasketed cover.
- G. Box extensions used to accommodate new building finishes shall be of same material as recessed box.
- H. Device Box Dimensions: 4 inches square by 2-1/8 inches deep
- I. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250.
 1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
 2. Nonmetallic Enclosures: Fiberglass
 3. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.
- J. Cabinets:
 1. NEMA 250, Type as specified or required by area, with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
 2. Hinged door in front cover with flush latch and concealed hinge.
 3. Key latch to match panelboards.
 4. Metal barriers to separate wiring of different systems and voltage.
 5. Accessory feet where required for freestanding equipment.
 6. Nonmetallic cabinets shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.6 HANDHOLES AND BOXES FOR EXTERIOR UNDERGROUND WIRING

- A. General Requirements for Handholes and Boxes:
 1. Boxes and handholes for use in underground systems shall be designed and identified as defined in NFPA 70, for intended location and application.
 2. Boxes installed in wet areas shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

PART 3 EXECUTION

3.1 RACEWAY APPLICATION

- A. Outdoors: Apply raceway products as specified below unless otherwise indicated:
 1. Exposed Conduit: GRC.
 2. Concealed Conduit, Aboveground: EMT
 3. Underground Conduit: Schedule 80 RNC or as noted on drawings
 4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC
 5. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R or Type 4.
- B. Indoors: Apply raceway products as specified below unless otherwise indicated:
 1. Exposed, Not Subject to Physical Damage: EMT.
 2. Exposed, Not Subject to Severe Physical Damage: EMT
 3. Exposed and Subject to Severe Physical Damage: GRC.
 4. Concealed in Ceilings and Interior Walls and Partitions: EMT.

5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
 6. Damp or Wet Locations: GRC.
 7. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4 in damp or wet locations.
- C. Minimum Raceway Size: 1/2-inch trade size.
- D. Raceway Fittings: Compatible with raceways and suitable for use and location.
1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
 2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with this type of conduit. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer and apply in thickness and number of coats recommended by manufacturer.
 3. EMT: Use setscrew or compression, steel fittings. Comply with NEMA FB 2.10.
 4. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.

3.2 INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum conduits. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.
- B. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
- C. Complete raceway installation before starting conductor installation.
- D. Comply with requirements in Division 26 Section "Hangers and Supports for Electrical Systems" for hangers and supports.
- E. Arrange stub-ups so curved portions of bends are not visible above finished slab.
- F. Install no more than the equivalent of three 90-degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 12 inches of changes in direction.
- G. Conceal conduit and EMT within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.
- H. Raceways Embedded in Slabs:
 1. Run conduit larger than 1-inch trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support. Secure raceways to reinforcement at maximum 10-foot intervals.
 2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
 3. Arrange raceways to keep a minimum of 1 inch of concrete cover in all directions.
 4. Do not embed thread less fittings in concrete unless specifically approved by Architect for each specific location.
- I. Stub-ups to Above Recessed Ceilings:
 1. Use EMT.
 2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.
- J. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4-inch trade size and insulated throat metal bushings on 1-1/2-inch trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.
- K. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.
- L. Surface Raceways:
 1. Install surface raceway with a minimum 2-inch radius control at bend points.
 2. Secure surface raceway with screws or other anchor-type devices at intervals not exceeding 48 inches and with no less than two supports per straight raceway section.
- M. Flexible Conduit Connections: Comply with NEMA RV 3. Use a maximum of 72 inches of flexible conduit for recessed and semirecessed luminaires, equipment subject to vibration, noise transmission, or movement; and for transformers and motors.

1. Use LFMC in damp or wet locations.
- N. Mount boxes at 48" for switches, 15" for receptacles or as indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to center of box unless otherwise indicated.
- O. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall. Prepare block surfaces to provide a flat surface for a raintight connection between box and cover plate or supported equipment and box.
- P. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.
- Q. Locate boxes so that cover or plate will not span different building finishes.
- R. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.
- S. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.
- T. Set metal floor boxes level and flush with finished floor surface.
- U. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.

3.3 INSTALLATION OF UNDERGROUND CONDUIT

- A. Direct-Buried Conduit:
 1. Excavate trench bottom to provide firm and uniform support for conduit. Prepare trench bottom as specified in Division 31 Section "Earth Moving" for pipe less than 6 inches in nominal diameter.
 2. Install backfill as specified in Division 31 Section "Earth Moving."
 3. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction as specified in Division 31 Section "Earth Moving."
 4. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through floor.
 - a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches of concrete for a minimum of 12 inches on each side of the coupling.
 - b. For stub-ups at equipment mounted on outdoor concrete bases and where conduits penetrate building foundations, extend steel conduit horizontally a minimum of 60 inches from edge of foundation or equipment base. Install insulated grounding bushings on terminations at equipment.
 5. Underground Warning Tape: Comply with requirements in Division 26 Section "Identification for Electrical Systems."

3.4 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies.

3.5 FIRESTOPPING

- A. Install firestopping at penetrations of fire-rated floor and wall assemblies.

3.6 PROTECTION

- A. Protect coatings, finishes, and cabinets from damage and deterioration.
 1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
 2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION 26 0533

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SECTION 26 0553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Identification for raceways.
 - 2. Identification of power and control cables.
 - 3. Identification for conductors.
 - 4. Underground-line warning tape.
 - 5. Equipment identification labels.
 - 6. Miscellaneous identification products.

1.3 ACTION SUBMITTALS

- A. Product Data: For each electrical identification product indicated.

1.4 COORDINATION

- A. Coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual; and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.
- B. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- C. Coordinate installation of identifying devices with location of access panels and doors.
- D. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 PRODUCTS

2.1 POWER AND CONTROL CABLE IDENTIFICATION MATERIALS

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway and cable size.
- B. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.
- C. Write-On Tags: Polyester tag, 0.015-inch-thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.
 - 1. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.
 - 2. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.
- D. Snap-Around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeve, 2 inches long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

2.2 CONDUCTOR IDENTIFICATION MATERIALS

- A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils) thick by 1 to 2 inches wide.
- B. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.
- C. Snap-Around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeve, 2 inches long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.
- D. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.
- E. Write-On Tags: Polyester tag, 0.015-inch-thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.
 - 1. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.

2.3 UNDERGROUND-LINE WARNING TAPE

- A. Tape:
 - 1. Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical utility lines.
 - 2. Printing on tape shall be permanent and shall not be damaged by burial operations.
 - 3. Tape material and ink shall be chemically inert, and not subject to degrading when exposed to acids, alkalis, and other destructive substances commonly found in soils.
- B. Color and Printing:
 - 1. Comply with ANSI Z535.1 through ANSI Z535.5.
 - 2. Inscriptions for Red-Colored Tapes: ELECTRIC LINE, HIGH VOLTAGE,
 - 3. Inscriptions for Orange-Colored Tapes: TELEPHONE CABLE, CATV CABLE, COMMUNICATIONS CABLE, OPTICAL FIBER CABLE

2.4 EQUIPMENT IDENTIFICATION LABELS

- A. Adhesive Film Label: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch
- B. Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch Overlay shall provide a weatherproof and UV-resistant seal for label.
- C. Self-Adhesive, Engraved, Laminated Acrylic or Melamine Label: Adhesive backed, with white letters on a dark-gray background. Minimum letter height shall be 3/8 inch
- D. Engraved, Laminated Acrylic or Melamine Label: Punched or drilled for screw mounting. White letters on a dark-gray background. Minimum letter height shall be 3/8 inch

2.5 CABLE TIES

- A. UV-Stabilized Cable Ties: Fungus inert, designed for continuous exposure to exterior sunlight, self-extinguishing, one piece, self-locking, Type 6/6 nylon.
 - 1. Minimum Width: 3/16 inch
 - 2. Tensile Strength at 73 deg F According to ASTM D 638: 12,000 psi (
 - 3. Temperature Range: Minus 40 to plus 185 deg F (olor: Black.
- B. Plenum-Rated Cable Ties: Self-extinguishing, UV stabilized, one-piece, self-locking.
 - 1. Minimum Width: 3/16 inch
 - 2. Tensile Strength at 73 deg F According to ASTM D 638: 7000 psi
 - 3. UL 94 Flame Rating: 94V-0.
 - 4. Temperature Range: Minus 50 to plus 284 deg F
 - 5. Color: Black.

2.6 MISCELLANEOUS IDENTIFICATION PRODUCTS

- A. Paint: Comply with requirements in Division 09 painting Sections for paint materials and application requirements. Select paint system applicable for surface material and location (exterior or interior).
- B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Verify identity of each item before installing identification products.
- B. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.
- C. Apply identification devices to surfaces that require finish after completing finish work.
- D. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.
- E. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
- F. System Identification Color-Coding Bands for Raceways and Cables: Each color-coding band shall completely encircle cable or conduit. Place adjacent bands of two-color markings in contact, side by side. Locate bands at changes in direction, at penetrations of walls and floors, at 50-foot (15-m) maximum intervals in straight runs, and at 25-foot (7.6-m) maximum intervals in congested areas.
- G. Cable Ties: For attaching tags. Use general-purpose type, except as listed below:

1. Outdoors: UV-stabilized nylon.
 2. In Spaces Handling Environmental Air: Plenum rated.
- H. Underground-Line Warning Tape: During backfilling of trenches install continuous underground-line warning tape directly above line at 6 to 8 inches below finished grade. Use multiple tapes where width of multiple lines installed in a common trench exceeds 16 inches overall.

3.2 IDENTIFICATION SCHEDULE

- A. Concealed Raceways, Duct Banks, More Than 600 V, within Buildings: Tape and stencil 4-inch- wide black stripes on 10-inch centers over orange background that extends full length of raceway or duct and is 12 inches wide. Stencil legend "DANGER CONCEALED HIGH VOLTAGE WIRING" with 3-inch high black letters on 20-inch centers. Stop stripes at legends. Apply to the following finished surfaces:
1. Floor surface directly above conduits running beneath and within 12 inches of a floor that is in contact with earth or is framed above unexcavated space.
 2. Wall surfaces directly external to raceways concealed within wall.
 3. Accessible surfaces of concrete envelope around raceways in vertical shafts, exposed in the building, or concealed above suspended ceilings.
- B. Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use color-coding conductor tape to identify the phase.
1. Color-Coding for Phase Identification, 600 V or Less: Use color coding for ungrounded service and feeder conductors.
 - a. Color shall be factory applied or field applied for sizes larger than No. 8 AWG,.
 - b. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.
- C. Power-Circuit Conductor Identification, More than 600 V: For conductors in vaults, pull and junction boxes, manholes, and handholes, use write-on tags nonmetallic plastic tag holder with adhesive-backed phase tags,
- D. Install instructional sign including the color-code for grounded and ungrounded conductors using adhesive-film-type labels.
- E. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.
1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.
 2. Use system of marker tape designations that is uniform and consistent with system used by manufacturer for factory-installed connections.
 3. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual.
- F. Locations of Underground Lines: Identify with underground-line warning tape for power, lighting, communication, and control wiring and optical fiber cable.
1. Limit use of underground-line warning tape to direct-buried cables.
 2. Install underground-line warning tape for both direct-buried cables and cables in raceway.
- G. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and the Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.
1. Labeling Instructions:
 - a. Indoor Equipment: Self-adhesive, engraved, laminated acrylic or melamine label Unless otherwise indicated, provide a single line of text with 1/2-inch- -) high letters on minimum 2 - inch- high label. Provide higher labels for more than 2 lines of text.
 - b. Outdoor Equipment: Engraved, laminated acrylic or melamine label
 - c. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.

- d. Unless provided with self-adhesive means of attachment, fasten labels with appropriate mechanical fasteners that do not change the NEMA or NRTL rating of the enclosure.
- 2. Equipment to Be Labeled:
 - a. Panelboards: Typewritten directory of circuits in the location provided by panelboard manufacturer. Panelboard identification shall be engraved, laminated label.
 - b. Enclosures and electrical cabinets.
 - c. Access doors and panels for concealed electrical items.
 - d. Switchgear.
 - e. Switchboards.
 - f. Transformers: Label that includes tag designation shown on Drawings for the transformer, feeder, and panelboards or equipment supplied by the secondary.
 - g. Substations.
 - h. Emergency system boxes and enclosures.
 - i. Motor-control centers.
 - j. Enclosed switches.
 - k. Enclosed circuit breakers.
 - l. Enclosed controllers.
 - m. Variable-speed controllers.
 - n. Push-button stations.
 - o. Power transfer equipment.
 - p. Contactors and associated controls (light switches, timeclocks, photocells).
 - q. Remote-controlled switches, dimmer modules, and control devices.
 - r. Battery-inverter units.
 - s. Battery racks.
 - t. Power-generating units.
 - u. Monitoring and control equipment.
 - v. UPS equipment.

END OF SECTION 26 0553

SECTION 26 2726 - WIRING DEVICES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Receptacles, receptacles with integral GFCI, and associated device plates.
 - 2. Snap switches.

1.3 SUBMITTALS

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

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of wiring device and associated wall plate through one source from a single manufacturer. Insofar as they are available, obtain all wiring devices and associated wall plates from a single manufacturer and one source.
- 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.
- C. Comply with NFPA 70.

1.5 COORDINATION

- A. Receptacles for Owner-Furnished Equipment: Match plug configurations.
 - 1. Cord and Plug Sets: Match equipment requirements.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. LIST OF ACCEPTABLE DEVICES

**** NOTE: ALL NEMA 5-20 RECEPTACLES SHALL BE TAMPER RESISTANT ****

MANUFACTURER	HUBBELL	LEVITON	P&S	
Switches 1-Pole	CS120	CS120	CS20AC	
Duplex Receptacle 20 amp	CR20TR	CR20T	CR20T	
Receptacle (20-amp GFCI)	GFTR20	Or equal	Or equal	
Receptacle (20-amp USB)	USB20A5	Or equal	Or equal	
Cover (In-Use, padlockable)	Taymac MX4280Z or equal, color selected by architect			

2.2 WALL PLATES

- A. Single and combination types to match corresponding wiring devices.
 - 1. Plate-Securing Screws: Metal with head color to match plate finish.
 - 2. Material for Finished Spaces: Thermoplastic nylon.
 - 3. Material for Damp Locations: Cast aluminum with spring-loaded lift cover, and listed and labeled for use in "wet locations."
- B. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with type 3R weather-resistant, heavy-duty, die-cast aluminum with lockable in-use cover.
- C. Kitchen: All wall plates in kitchen areas shall be stainless steel.

2.3 FINISHES

- A. Color: Wiring device catalog numbers in Section Text do not designate device color.
 - 1. White or as selected by Architect, unless otherwise indicated or required by NFPA 70 or device listing.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Comply with NECA 1, including the mounting heights listed in that standard, unless otherwise noted.

- B. Coordination with Other Trades:
 - 1. Take steps to insure that devices and their boxes are protected. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of the boxes.
 - 2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
 - 3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
 - 4. Install wiring devices after all wall preparation, including painting, is complete.
- C. Conductors:
 - 1. Do not strip insulation from conductors until just before they are spliced or terminated on devices.
 - 2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
 - 3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.
 - 4. Existing Conductors:
 - a. Cut back and pigtail, or replace all damaged conductors.
 - b. Straighten conductors that remain and remove corrosion and foreign matter.
 - c. Pigtailing existing conductors is permitted provided the outlet box is large enough.
- D. Device Installation:
 - 1. Replace all devices that have been in temporary use during construction or that show signs that they were installed before building finishing operations were complete.
 - 2. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
 - 3. Connect devices to branch circuits using pigtails that are not less than 6 inches in length.
 - 4. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
 - 5. Tighten unused terminal screws on the device.
- E. Receptacle Orientation:
 - 1. Install ground pin of vertically mounted receptacles down.
- F. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.
- G. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multi-gang wall plates.
- H. Adjust locations of floor service outlets and service poles to suit arrangement of partitions and furnishings.

3.2 IDENTIFICATION

- A. Comply with Division 26 Section "Identification for Electrical Systems."
 - 1. Receptacles: Identify panelboard and circuit number from which served. Use label maker with minimum ¼ lettering. Lettering to be on surface of receptacles in unfinished spaces and on inside of plate on finished spaces.

END OF SECTION 26 2726

Feature and Option Summary

Criteria Sheet LYNX MODEL 410LX Cage & Rack Washer	Montana U SN 2988
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CHAMBER SIZE:	Std.					Modification Description
Base Unit - (46Wx85Hx92D)	x					
Modular Construction	x					
Oscillating Spray Jet System	x					
Insulated Construction	x					
Personnel Safety Features	x					
Multi-Cycle Microprocessor	x					
Auto. 10-Phase Treatment Cycle	x					
Automatic Self Cleaning Screen	x					
Temperature Guarantee	x					
Ethernet	x					
Modem- H (Perm install)	x					
Illuminated Chamber	x					
Incoming Utility Gauges	x					
SS Recirculating Components and Piping	x					
UL Control System Inspection	x					
DOOR(s) CONFIGURATION/HINGE SIDE:	x					
Pass Through, Load (R), Unload (L)	x					
MOUNTING CONFIGURATION:	x					
Pit Mounted - Left Service	x					
Voltage:	x					
480 VAC, 3-Phase, 60 Hz	x					
OPTIONAL FEATURES:	x					
"Reusable-Throwaway" Alkaline Detergent System	x					
Non-Heated	x					
Descaling System - Alk. Tank Only (Elecmech-no)	x					
Nonrecirculated Hot Water Final Rinse	x					
Automatic Damper	x					
DCCD System - Injected	x					
LYNX Smart Cool-Down System	x					
Feeder Bottle Wash System	x					
LYNX OPTI-WASH System (Includes NRFR)	x					
Thumb Drive Recording System - USB	x					
1/3 View Door	x					
ACCESSORIES:	x					
Barrier Wall Flange - One (1) wall	x					
Feeder Bottle Cart - 6 Basket Capacity	x					
Cage Wash Rack - 4 pair shelves	x					
INSTALLATION:	x					
Knock Down Shipment	x					
Crate & Freight - West	x					
Nonunion	x					
Uncrate, and Set in Place	x					
Reassembly - West	x					
# of Manuals	3					
Standard Warranty 2-Year	x					
One (1) Year Preventative Maintenance - Two (2) Visits	x					
SPECIALS & CUSTOMS:	x					
Pit Pads	x					

Important Information to return to LYNX:	
Project Contact Name	
Project Contact Phone & Email	
Ship to Address for Equipment	
Egress to location of reassemble	
Elevator Size (if applicable)	
Elevator Weight Limit (if applicable)	
WAN "wide area network" connection for online troubleshooting	
Special Requirements for LYNX Techs to be on site	



Application

The Cage and Rack Washer is a heavy-duty, large capacity, high-impingement hydro-spray washer designed for thorough, efficient cleaning of cages, racks, debris pans, and miscellaneous items used in the care of laboratory animals.

The unit is designed to be either Floor or Pit mounting for ease of loading and unloading.

SIZE

Compartment- 46" wide x 85" high x 92" long
Overall Unit*- 84" wide x 94" high* x 100" long

STANDARD FEATURES

KNOCK-DOWN MODULAR CONSTRUCTION

The washer is designed for complete disassembly into sections small enough to fit most elevators and for entry into existing facilities. Uncrated sections can pass through a 3'0" x 6'8" standard doorway.

OSCILLATING SPRAY JET SYSTEM

The washer is provided with an oscillating jet-spray system for all treatment solutions. The system consists of high-impingement machined jets mounted on spray trees suspended from an oscillating carriage traveling on self-lubricating machined wheels.

The jets are positioned to reach all cart and cage surfaces, including the underside of shelves and base.

The system is driven with a bi-directional pneumatic cylinder in conjunction with the treatment schedule. The unit is equipped with a safety system to prevent the oscillating header from damaging items being washed. Interference of greater than 15 seconds will be indicated visually and audibly to the operator.

INSULATED CONSTRUCTION

Washer cabinet is completely insulated to minimize noise, hot outer surfaces, and heat rejection.

Washer door(s) are provided with insulated double-pane viewing window, with a choice of:

- Full view
- 1/3 view
- 16" x 16"

PERSONNEL SAFETY FEATURES

Opening the door (either load-end or unload-end if pass-through unit) automatically stops operation of the washer.

The door(s) must be closed, alarm acknowledged, and the "Cycle Start" button depressed to continue operation from the beginning of the interrupted phase.

Two (2) red safety cables are installed inside the wash chamber (one on each side). If either cable is pulled, all operation of the washer is immediately stopped.

The door(s) (load-end or unload-end if pass-through unit) are designed with an explosion-release closures, that readily open when pushed from inside the cabinet. An Emergency Stop (ES) button is provided on the load-end control panel (and unload-end if pass-through unit).

If the operations of the wash cycle are interrupted by pressing the (ES) Button, all operations stop and the operator must restart the system.

MULTI-CYCLE COLOR/GRAPHIC PLC CONTROL SYSTEM

A named brand (GE or Allen Bradley) solid-state PLC control system monitors and automatically controls all process operations and functions. Any of the twelve-cycles may be operator named and configured with specific treatment phases to permit a wide variety of loads and processing requirements. Individual cycle phase times and temperatures and other key process parameters are programmable.

Each cycle may be locked by supervision to ensure process integrity. Cycle programming is controlled by a supervisory access code. With the optional Strip-Chart Printer, each cycle program may be reviewed and printed on demand.

AUTOMATIC TEN-PHASE TREATMENT CYCLE

The standard treatment cycle may consist of any of the following phases: Pre-wash, Agent Wash 1, Agent Flushing Rinse, Agent Wash 2, Acid Neutralizer, First Rinse, Second Rinse, Final Rinse, and Vapor Removal. Any or all cycle phases may be selected or deselected by the user.

All Agent Wash (Alkaline or Acid) and Rinse treatments are recirculated under pump pressure. The cycle, once activated, is completely automatic.

DATA COMPUTER PORT

An Ethernet port is provided for the ability to download cycle data to a remote computer terminal. Custom software may be required to accommodate specific applications.

MODEM

A modem is supplied for online service diagnostics, evaluations, and software upgrades. With this system, a factory engineering personnel may be contacted by the customer to provide immediate access to the unit's control system.

Factory-based service personnel will have the ability to troubleshoot, identify system malfunctions, and recommend repairs to local maintenance personnel within minutes of a malfunction, reducing expensive onsite repair technician costs. Immediate access also allows the customer the ability to perform maintenance repairs internally, minimizing lost productivity due to possible equipment downtime.

NOTE: The Modem requires either a dedicated analog phone line or an Ethernet line to the washer.

FACTORY SOFTWARE RESTORATION

The unit shall be provided with a backup software/program stored on a flash drive.

AUTOMATIC SELF-CLEANING DEBRIS SCREEN

The treatment pump(s) are provided with high capacity self-cleaning debris screen which automatically flush debris to the building drain when the unit is drained. To help prevent jet plugging, the screen is provided with holes that are considerably smaller than the size of the machined jet orifices. The screen is inter-piped and inter-wired with the control system to filter all solutions.

TEMPERATURE GUARANTEE

The operator may select to guarantee the temperatures for any of the recirculated phase of the cycle. If the temperature guarantee is selected, the phase time does not begin to count down until the recirculated water temperature reaches the set point. If the recirculated temperature drops below the set-point during phase, the timer shall pause until the set temperature is again met. The phase-timer continues from where it stopped to guarantee the proper temperature for the entire phase.

INCOMING UTILITY GAUGES

The incoming steam, hot and cold water supplies are provided with incoming strainers and pressure gauges. Hot and cold water supplies are also provided with temperature gauges.

OPERATION

STAINLESS STEEL RECIRCULATING COMPONENTS AND PIPING

All piping and components, including valves, pumps, and piping that come in contact with the recirculated wash solutions shall be provided in stainless steel.

UL – INSPECTED CONTROL SYSTEM

The main control panel is inspected and labeled in accordance to the UL 508A standards.

OPERATION

The operator places the items to be cleaned in the wash chamber, closes the door, selects the proper cycle, and presses the “Cycle Start” button.

The washer proceeds through the treatment schedule and automatically shuts off at the completion of the cycle. The operator then opens door and removes the cleaned items. TREATMENT SCHEDULE - (May be programmed with any or all phases below)

PRE-WASH

Water remaining in the chamber sump from final rinse of the previous cycle is recirculated through the jet system under pump pressure and pumped to drain upon completion. Phase is adjustable from 0 - 9999 seconds in 1-second intervals and 120°F - 190°F in 1° intervals.

ALKALINE WASH

Hot water from the house supply or detergent solution from the (OPTIONAL) wash solution reservoir fills the sump and is pumped through the jet system. As required, an alkaline detergent is added during recirculation, using either the optional LYNX or customer-supplied detergent injection pumps.

At the end of the treatment, the detergent solution is either returned to the (OPTIONAL) solution reservoir or pumped to drain at the discretion of the operator. Phase is adjustable from 0 - 9999 seconds in 1-second intervals and 60°F - 200°F in 1° intervals (May be displayed in Celsius).

DETERGENT FLUSHING RINSE

Hot water from house supply fills the chamber sump and is recirculated through the jet system under pump pressure to remove residual detergent. Recirculated water is pumped to drain on completion of treatment.

ACID WASH

Hot water from the house supply or Acid solution from the (OPTIONAL) acid solution reservoir fills the sump and is pumped through the jet system. As required, an acid detergent is added during recirculation, using either the optional LYNX- or customer-supplied detergent injection pumps.

At the end of the treatment, the acid solution is either returned to the (OPTIONAL) solution reservoir or pumped to drain at the discretion of the operator. Phase is adjustable from 0 - 9999 seconds in 1-second intervals and 60°F - 200°F in 1° interval (May be displayed in Celsius).

NEUTRALIZATION

A neutralization phase may be programmed to add a neutralizing agent to adjust the pH of either the acid or alkaline solution prior to discharging to drain.

The neutralizer is injected for a select time, and then is recirculated to mix with the entire solution completely. Upon completion, the neutral pH solution is sent to drain.

FIRST RINSE

Hot water fills the sump and is recirculated through the jet system under pump pressure. Recirculated water is pumped to drain or may be retained in the sump to be used as the pre-wash water for the next cycle (if the last phase of the cycle).

Phase is adjustable from 0 - 9999 seconds in 1-second intervals and 60°F - 200°F in 1° intervals (May be displayed in Celsius).

SECOND RINSE

Same as the first rinse.

THIRD or FINAL RINSE

Same as the first rinse.

With the purchase of the **NON-RECIRCULATED FINAL RINSE OPTION**, the operator has the option to have the load be sprayed with fresh house water through a separate and dedicated spray system saving both water and time. Water may be retained in the sump to be used as the pre-wash in a subsequent wash load. The phase is adjustable from 0 - 999 seconds in 1-second intervals. (Typically 15 second duration).

EXHAUST

The unit stands idle for a sufficient length of time to remove the residual vapors.

CONSTRUCTION

The base, wash chamber and chamber sump are of stainless steel and smooth construction, without crevices and ledges for the potential build-up of debris and contamination. The base and chamber sump are of one-piece welded construction, with the base containing integral door-gutters and floor grating supports.

The chamber door(s) are of double wall construction, insulated, and are equipped with explosion-release closures, heavy-duty hinges, and a large-view tempered double-pane glass observation window.

The washer cabinet is entirely insulated and covered by protective stainless-steel panels.

The wash chamber floor shall consist of smooth heavy-duty stainless-steel flooring covering 3 of 9 entire floor interior. The smooth flooring promotes both ease and quiet loading of racks.

The chamber sump is equipped with a level-control, automatic water fill port, chemical injection ports, and a stainless steel steam coil heating the recirculated treatment solutions.

The control system displays and monitors recirculated solution temperatures. Sump shall be drained after each phase, preventing cross-contamination between treatment phases and cycles.

All recirculated treatments are under pump pressure of a 10-Hp horizontal pump. The pump system is equipped with a solid state pressure sensor.

The stainless steel steam coil heating systems in the chamber sump is complete with condensate return, vacuum breakers, and steam traps. Steam coil is designed to ASME Section VIII, Div. 1, Unfired Pressurized Vessel Code, and are easily removable for cleaning or maintenance.

The washer is equipped with a transformer for the control circuit; integral Type-2 coordinated protective magnetic starters requiring no upstream fuses for overload protection of all motors, and all other electrical components required for the operation.

Exterior mounted LED lighting is provided to illuminate the wash chamber.

The washer is equipped with pneumatically actuated ball valves to control the output of the pump to the jet system, drain or detergent solution return systems.

The washer is inter-piped and inter-wired so that only one connection is required for each service or utility.

The washer is supplied with four (4) threaded detergent injection ports and electrical connections for the installation of automatic detergent injection pumps. Washer sump is also equipped with one (1) threaded half-coupling for the connection of external devices.

Programming is in Military time and Fahrenheit or Celsius temperature. Times and temperatures are expressed in seconds and full degree increments, respectively. An internal battery backs up all cycle memory for up to ten years.

A highly visible color touch screen displays cycle program data on demand and real-time in-process cycle performance. All cycle deviations are indicated with both visual and audible alarms that must be acknowledged by the operator.

The washer is designed to meet specifications by placing all serviceable components on either the right-hand or left-hand side of the washer, as viewed from the load-end.

The washer is provided with one (1) additional dry electrical contact for control of external damper(s) installed in the facility HVAC system (by customer).

DOOR CONFIGURATION - DOOR SWING (HINGE SIDE):

Single Door - Right Hand

Single Door - Left Hand

Pass-Through, Load (Right),

Unload (Left) Pass Through, Load (Right), Unload (Right)

Pass-Through, Load (Left), Unload (Right) Pass-Through,

Load (Left), Unload (Left)

MOUNTING CONFIGURATION (select one):

Floor Mounted, Right-Hand Service Access

Floor Mounted, Left-Hand Service Access

Pit Mounted, Right-Hand Service Access Pit Mounted,

Left-Hand Service Access

VOLTAGE (select one):

208 Vac, 3-Phase 60 Hz, 3 Phases Only

230 Vac, 3-Phase 60 Hz 480 Vac, 3-Phase 60 Hz 575 Vac, 3-Phase 60 Hz

OPTIONAL FEATURES

"REUSABLE - THROWAWAY" ALKALINE

DETERGENT SYSTEM - OPTIONAL

The washer is provided with a wash solution side tank with a minimum 2x sump capacity to allow the reuse of the alkaline detergent solution.

The system has the capability of automatically returning the alkaline detergent solution to the side tank or pumping to drain based on a number of cycles. The tank is equipped with automatic water fill, level control, and overflow piping.

Non-heated

Heated

The optional heated tank is available with a separate heating coil to maintain the detergent water at a specified temperature. With this feature, the side tank is provided with an additional stainless steel steam coil to heat and maintain the wash solution temperature.

The tank solution temperature is automatically controlled by the PLC control system.

DESCALING SYSTEM - ALKALINE TANK ONLY

This system operates in conjunction with the Reusable-Throwaway alkaline detergent system. The system provides an automatic operation to drain the tank, spray the bottom and sides of the tank to flush loose debris. The tank is then refilled with fresh hot tap water and acid is added via customer-LYNX-supplied dispenser.

The tank is stirred and agitated to help dissolve and break up scale. The tank drains, and the interior and bottom are rinsed once again.

"REUSABLE - THROWAWAY" ACID DETERGENT SYSTEM

The washer is provided with a wash solution side tank with a minimum 2x sump capacity to allow the reuse of the acid solution. The system has the capability of automatically returning the acid solution to the side tank or pumping to drain based on a number of cycles. The tank is equipped with an automatic water fill, level control, and overflow piping. The washer width is increased by 14" for each additional tank selected.

Non Heated Heated

The optional heated tank is available with a separate heating coil to maintain the detergent water at a specified temperature.

With this feature, the side tank is provided with an additional stainless steel steam coil to heat and maintain the wash solution temperature. The tank solution temperature is automatically controlled by the PLC control system.

NON-RECIRCULATED FINAL RINSE

The final rinse treatment consists of hot water from house supply sprayed through a separate set of jets. The water shall not be recirculated.

HOUSE HOT WATER HEAT EXCHANGER

For facilities with low temperature hot water, the washer is equipped with an in-line heat exchanger to raise the "house hot water" supply temperature by approximately 60° to 80°F.

The internal sump coil of the washer heats the recirculated water to set temperature as needed. The heat exchanger is inter-piped and inter-wired for automatic operation.

AUTOMATIC WATERING RACK FLUSH SYSTEM

Washer is capable of flushing two (2) automatic watering racks with fresh house cold water during the final rinse phase.

System is supplied with two stainless steel hoses with quick-disconnect hose connections and a pressure-reducing station for the house water line.

AUTOMATIC DAMPER

The washer is provided with an automatically actuated damper mounted in the exhaust lines and coordinated with the automatic cycle.

Dampers are fully open during the exhaust phase and closed during washer operation. Dampers are designed for vertical connection to exhaust vent system.

90-DEGREE AUTOMATIC DAMPER

The washer is provided with an automatically actuated damper mounted in the exhaust line and coordinated with the automatic cycle.

Damper is fully open during the exhaust phase and closed during washer operation. Damper is designed with 90° angle for connection to horizontal exhaust vent systems.

EXHAUST FANS

The washer is provided with in-line stainless steel exhaust fans inter-wired with the PLC control system to exhaust residual vapors from within the wash chamber.

Fan is supplied complete with three-phase, 60 Hz motor and an integral Type-2 coordinated protective magnetic starter. Fan is designed to push exhaust a short distance at approximately ½" static pressure. Fan is provided with remote mounted grease fittings for convenient access.

"SMART" COOL-DOWN SYSTEM

The washer is provided with an Eco-Friendly air-cooled effluent cool-down system. Cold-conditioned air is pulled through the chamber to cool effluent rapidly without needing for cold water.

The effluent is cooled to 140 degrees or below before discharging to drain. The system is designed not to add additional time to the overall cycle.

DRAIN DISCHARGE COOL-DOWN SYSTEM WITH COLD WATER INJECTION

The washer is provided with a cold-water inlet valve, integral with the drain line, to add cold water during draining to reduce the effluent temperature.

A temperature gauge is included on the cold-water inlet piping. A cold-water connection is required when this option is selected.

DRAIN DISCHARGE COOL-DOWN SYSTEM WITH SURGE TANK

The washer is provided with a cool-down tank, integrally mounted to side of washer, to accept all pumped drain discharges. A cold water valve is energized each time effluent is pumped to the tank. The hot effluent is cooled as it is mixed with cold water and gravity-drained.

Washer width is increased by 14" and a cold-water connection is required when this option is selected.
DRAIN DISCHARGE COOL-DOWN SYSTEM WITH SURGE TANK AND TEMPERATURE GUARANTEE.

The washer is provided with a cool-down tank, integrally mounted to side of washer, to accept all pumped drain discharges. By controlling the mixing of cold water, all discharges are cooled to below the customer-programmed set-point (generally 140°F) before gravity-draining to building drain system.

The system is controlled through an automatically actuated ball valve and temperature probe, and does not drain unless the effluent has been cooled to or below the set point temperature.

Washer width is increased by 14" and a cold-water connection is required with this option.

PASS-THROUGH DOOR INTERLOCK SYSTEM

The system prevents both load-end and unload-end doors from being opened at the same time, eliminating the risk of cross-contamination.

When one door is opened, the opposite door is locked. When both doors are shut, both doors are in an unlocked mode allowing either to be readily opened if needed. If power is lost, both doors will fail in the open position.

AIR COMPRESSOR

The washer is provided with an air compressor inter-piped with an automatic control system to supply the air demand required by the washer.

The compressor will be supplied with regulator, filter, holding tank, and an automatic drain valve to eliminate condensate. A separate 120V, 20A electrical supply is required for this option.

STAINLESS STEEL SERVICE ACCESS PANELS

The washer is provided with a set of stainless steel enclosure panels with supports to fully enclose the service-component side of the washer. Panels are removable for easy access.

SPLIT BASE FOR SPECIAL ENTRY INTO BUILDING

Base of Rack Washer is shipped in 2 or more sections and welded in place on site to provide a water-tight system. Split base is for egress into limited elevator sizes, or through tight hallways.

INCLINED FLOOR GRATING

Floor grating sections are fixed at a pitch of 1" at unload-end to help drain flat solid surfaces of certain cages, pans, and racks that drain poorly.

AUTOMATIC INCLINED FLOOR GRATING

During the wash cycle, the floor grating sections shall automatically raise to a pitch of 1" side to side to help drain flat solid surfaces of certain cages, pans, and racks that drain poorly.

FEEDER BOTTLE WASHING SYSTEM

The washer is equipped with a solution coupling, capable of diverting all recirculated wash and rinse solutions through a bottle-washing cart. System is inter-piped and inter-wired for automatic operation.

A Bottle-Washing Cart with a 4- or 6-basket capacity is required for use with this option.

PAN WASHING

The washer is provided with a built-in pan rack on one (1) side of the washer chamber and additional jets mounted on the spray trees spraying outward at the pans for simultaneous washing of debris pans, cage floors while washing cages in the center chamber.

Washer and pit (if applicable) are 8" wider when this option is selected.

LYNX OPTI-WASH SYSTEM

The washer is supplied with a separate non-recirculated rinse header, and all components and programming allowing the operator to choose between non-recirculated or recirculated rinses for any phase of their cycle.

By utilizing the non-recirculated rinse between phases, the cycle time and overall utility consumptions are minimized. The OPTI-Wash™ system enables the operator to run fast and highly efficient, low-water cleaning and disinfecting cycle.

A typical rodent cycle time is estimated at less than 10 minutes without disinfections and less than 15 minutes with disinfection. No side tanks are required with this option.

LYNX OPTI-WASH -II SYSTEM

The washer is supplied with separate heated fresh water and detergent water, re-useable throw-away side tanks, a non-recirculated rinse header, and all components and programming allowing the operator to choose between non-recirculated or recirculated rinses for any phase of their cycle.

By utilizing the re-useable throw-away side tanks and the non-recirculated rinse between phases, the cycle time and overall utility consumptions are minimized.

The OPTI-WASH-II™ system enables the operator to run the most efficient and quickest cleaning cycles. A typical rodent cycle time is estimated at less than 8 minutes without disinfections and less than 12 minutes with disinfection.

FLOOR SPRAY HEADER

A stationary spray header is mounted in the floor of the unit to add additional treatment spray coverage to the underside of the loads.

SEISMIC TIE-DOWN

Washer is designed to comply with Seismic Zone 3 and 4 requirements.

STRIP-CHART PRINTER

A 40-column impact printer with paper take-up is provided to record all cycle program parameters and process performance data. Each program time/temperature profile may be printed as required.

REMOTE-MOUNTED CONTROL COLUMN

The washer is provided with added wire harness length to remote mount the electrical box up to 20 feet from the unit. Field connections for remote mounting of the control column and brackets are provided with this option. An appropriate conduit chase for the wire harness is to be provided by the customer.

INTEGRAL DATA COLLECTION SYSTEM

In lieu of, or in addition to an integral strip chart printer, the Data Collection System is provided to track, record, and store performance data as it is created during the run process of the washer. This data can be downloaded for printing or future reference and compliance purposes.

Data such as date, time, cycle parameters, phase times and temperatures, alarms and other machine functions are captured and logged. Several options are available for storage:

Thumb drive Recording System

All data is recorded onto a removable USB Thumb drive in CSV format.

Plug & Play

Custom LYNX data logging program downloaded onto a LYNX provided dedicated laptop. Customer shall take ownership of laptop and connectivity, network internet for data retrieval.

Software Package on to Customer's network

Custom LYNX data logging program downloading to be coordinated with customer's IT department onto customer's network. LYNX to provide program and technical assistance for the upload and coordination for the system to accept data from the washer.

Customer shall coordinate connectivity, network for data retrieval.

CSA - INSPECTED CONTROL SYSTEM

The main control panel shall be inspected and labeled in accordance with CSA Standards.

THROWAWAY ALKALINE DETERGENT INJECTION SYSTEM

The washer is equipped with a liquid detergent injection pump, detergent pick-up tube, and 50 feet of tubing for timed direct injection of alkaline detergent into the chamber sump during the alkaline wash phase.

"REUSABLE-THROWAWAY" ALKALINE DETERGENT INJECTION SYSTEM

The washer is equipped with a liquid detergent injection pump, a detergent pick-up tube, 50 feet of tubing, a conductivity controller, and a conductivity probe. The unit automatically monitors water/chemical conductivity and injects alkaline detergent into the chamber sump during the alkaline wash phase.

THROWAWAY ACID DETERGENT INJECTION SYSTEM

The washer is equipped with a liquid detergent injection pump, detergent pick-up tube, and 50 feet of tubing for timed direct injection of acid detergent into the chamber sump during the acid wash phase.

"REUSABLE-THROWAWAY" ACID DETERGENT INJECTION SYSTEM

The washer is equipped with a liquid detergent injection pump, a detergent pick-up tube, 50 feet of tubing, a conductivity controller, and a conductivity probe. The unit automatically monitors water/chemical conductivity and injects acid detergent into the chamber sump during the acid wash phase.

AUTOMATIC ALKALINE NEUTRALIZATION INJECTION SYSTEM

The washer is equipped with a liquid detergent injection pump, detergent pick-up tube, and 50 feet of tubing for timed direct injection of neutralizer into the chamber sump after an alkaline wash phase to neutralize the alkaline wash solution.

AUTOMATIC ACID NEUTRALIZATION INJECTION SYSTEM

The washer is equipped with a liquid detergent injection pump, detergent pick-up tube, and 50 feet of tubing for timed direct injection of neutralizer into the chamber sump after an acid wash phase to neutralize the acid wash solution.

pH NEUTRALIZATION MONITORING SYSTEM

The washer is equipped with control hardware and pH probe to monitor and control the pH level of drain discharge. Each time the washer attempts to drain, the pH level is checked. If the pH level is within a pre-set range, the washer will drain.

If not, the proper neutralizing agent is injected, and the solution is recirculated and tested again. This process is repeated three times until all parameters are met. If, after the third test, the parameters are not met, an alarm will sound.

The system includes all controls and is inter-piped and inter-wired for automatic operation. Chemical pumps are available but are not included with the system.

ACCESSORIES

FLOOR-MOUNTED RAMPS

Floor-mounted units are provided with a stainless steel ramp with a non-skid surface for each doorway of the washer. Ramp(s) cover the full door width and extend out 5'.

BARRIER WALL FLANGE ASSEMBLY

The washer is provided with a stainless-steel trim flange to enclose the opening between one end of the washer and the masonry/ CMU wall opening.

Recessed one (1) wall

Recessed two (2) wall

MODULAR WALL

A stainless-steel modular wall assembly is designed and manufactured to create a walled enclosure or close off an open wall area. All materials and fasteners are of stainless-steel construction.

Linear Feet

Linear Feet (Insulated) 30" Access Door

30" Insulated Access Door

BOTTLE-WASHING CART

A stainless-steel bottle-washing cart is designed to couple with the feeder bottle-washing system. Load capacity:

Four (4) baskets

Six (6) baskets

UNIVERSAL CAGE AND PAN WASH RACK

The Universal Wash Rack is a heavy-duty stainless-steel rack that holds rodent cages and/or debris pans for thorough, efficient cleaning.

The rack holds rodent cages from 5" to 8" in height with three (3) rows on each side of the rack, or debris pans up to 2" in height with two (2) rows on each side of the rack.

The length and width of rodent cages and pans may vary. The standard unit has two (2) pair cage wash racks and one (1) pair pan wash rack.

CAGE WASH RACK

The Cage Wash Rack is a heavy-duty stainless steel rack designed for thorough, efficient cleaning of various sizes of rodent cages and lids.

The rack holds rodent cages from ½" to 8" in depth. The standard unit has four (4) rows on each side of the rack. To maximize the washing capabilities of this wash rack, there is an option for a fifth (5) tier.

Cages are securely supported in place by using an adjustable retainer bar. The rack can accommodate up to 140 standard mouse boxes or 100 standard rat boxes.

MATERIALS OF CONSTRUCTION

Standard Items

1. Base & Chamber Sump
2. Wash Solution Reservoir(s)
3. Door Panels
4. Side and Top Panels
5. Recirculation Valves and Components
6. Internal Water and Steam Piping
7. Drain Piping
8. Drain Valves and Components
9. Steam Piping – External
10. Water Piping
11. Spray Jets
12. Steam Coils
13. Treatment Pump

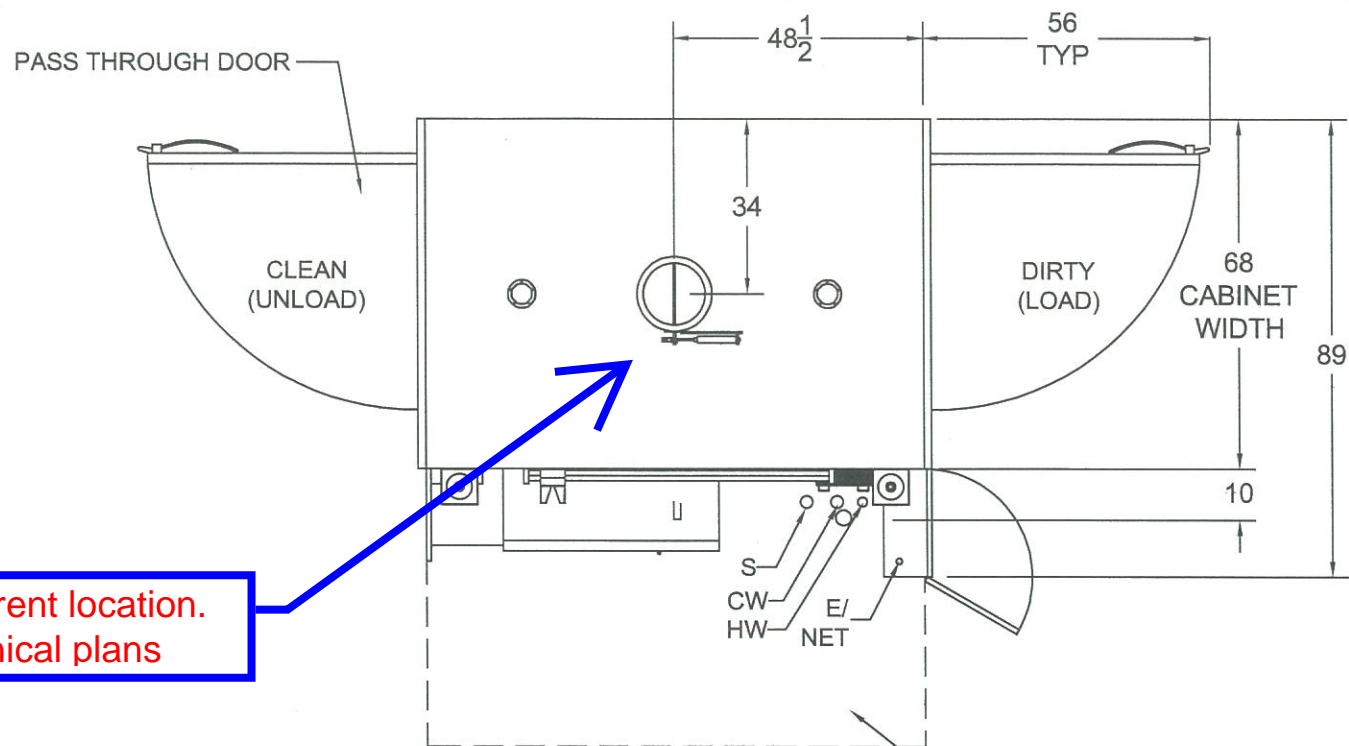
Optional Items

14. Barrier Flange(s)
15. Modular Walls

Materials

- 12 Ga. 304 S/S
- 12 Ga. 304 S/S
- 16 Ga. 304 S/S
- 14 Ga. 304 S/S
- 304 S/S
- 304 S/S
- 304 S/S
- 304 S/S
- Schedule 80, Black Iron
- 304 S/S
- 304 S/S
- 304 S/S
- 316 S/S

- 20 Ga. 304 S/S
- 304 S/S



Duct in different location. See mechanical plans

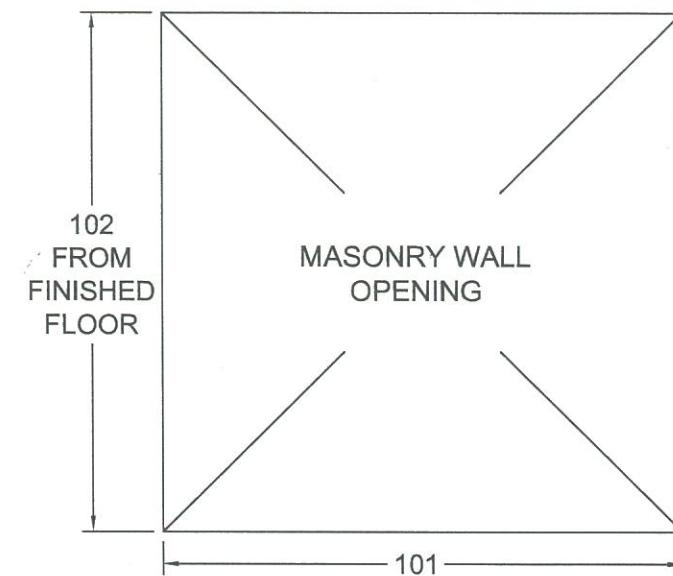
APPROVAL REQUIRED

LYNX WILL NOT MANUFACTURE WITHOUT RECEIVING CUSTOMER APPROVAL.

- APPROVED WITHOUT COMMENT
- APPROVED AS NOTED
- NOT APPROVED - RESUBMIT

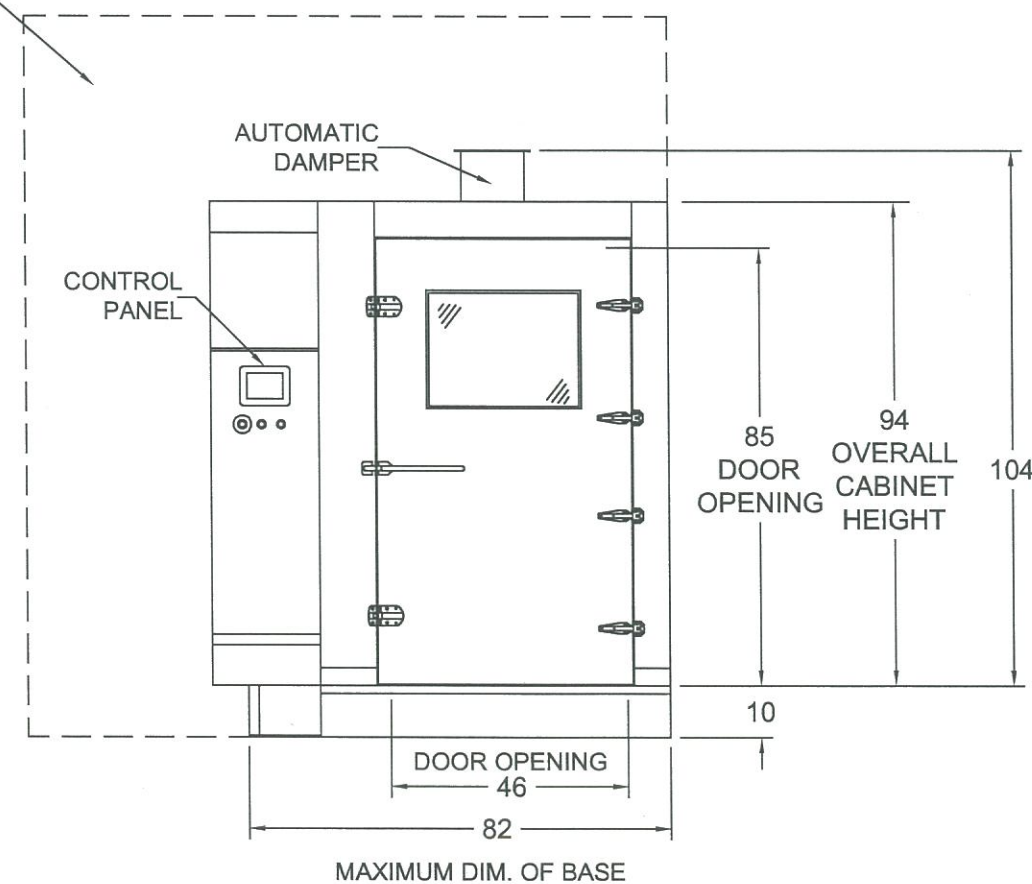
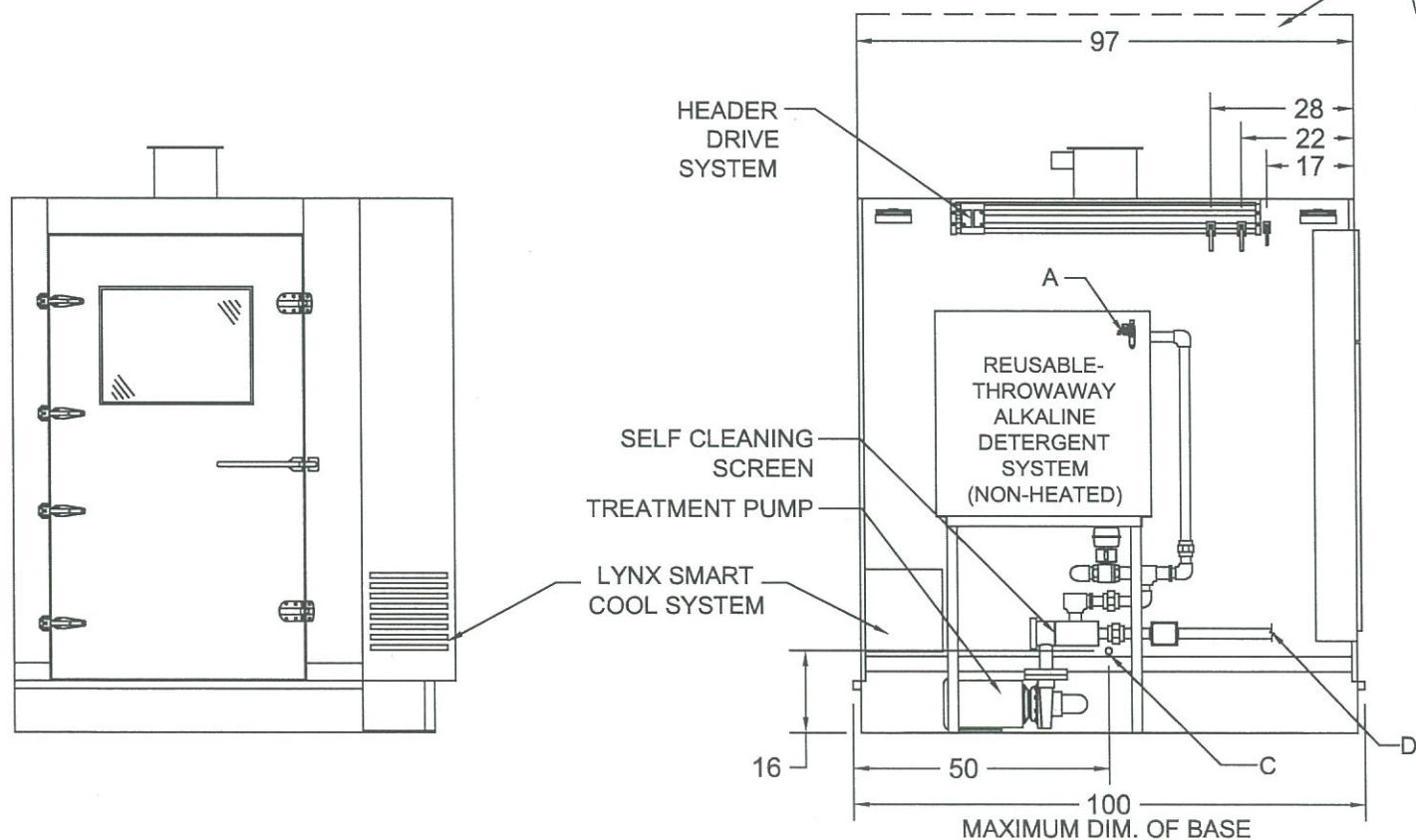
BY: _____ DATE: ___/___/___

Some dimensions and info in this document may be different than that shown on construction documents. Generally, the construction documents should be more more up to date. Discuss any discrepancies with Architect.



LYNX REQUIRED SERVICE AREA TO BE KEPT CLEAR. ANY SPACE WITH LESS THAN 36" CLEARANCE ABOVE AND ON SERVICE SIDE TO BE APPROVED BY LYNX.

RECOMMENDED TEMPERATURE IN SERVICE AREAS NOT TO EXCEED 95°



REV.	ECO	DESCRIPTION	BY	DATE

PROJECT MANAGER		ENGINEERING	
APPROVED BY:	DATE: 3/6/23	APPROVED BY:	DATE: 3/6/23
CUSTOMER INFO:		FLOOR: FLOOR NUMBER	
Montana State University		ROOM: ROOM NUMBER	
Leon Johnson Hall; 6th & Grant Street - MSU Campus		ROOM NUMBER	
Bozeman, MT		TITLE:	
Lynx Cage & Rack Washer		MODEL(S):	
410LX		SIZE: 46W x 85H x 92L	

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- FOR APPROVAL
 - FOR RECORD ONLY
 - AS BUILT
 - PRELIMINARY

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DRAWN BY:	JOB NO:
jtrank	2998
DATE:	SERIAL NO:
3/6/2023	2998
SHEET:	SCALE:
1 of 2	
DRAWING NUMBER:	REV:
EQ110042137	-



UTILITY REQUIREMENTS

E*	ELECTRICAL	3-60-480 V	12 HP
S*	STEAM	2-1/2 NPT 15-45 PSI (±5 PSI)	FLOW RATE: 800 LBS/HR
HW*	HOT WATER	1-1/2 NPT 35 PSI (±5 PSI) @ 140°F MAX. HARDNESS: 100 PPM MAX. DISOLVED SOLIDS: 250 PPM	FLOW RATE: 50 GPM @ 140°F (±5°F) 40 GAL SUMP CAPACITY
C*	CONDENSATE RETURN	1 NPT	ANY BACK PRESSURE ON THE CONDENSATE TO BE APPROVED BY LYNX
D*	DRAIN	12 x 12 FLOOR SINK WITH 4 INCH FLOOR DRAIN (MINIMUM)	FLOW RATE: 120 GPM @ 195°F (140°F W/ DDCD) FINAL RUN TO DRAIN BY OTHERS THAN LYNX
V*	VENT	12 INCH (I.D.) DUCT	FLOW RATE: MAINTAIN 450 CFM SATURATED VAPOR @ 190°F STATIC PRESSURE: 3/4 IWC
CW*	COLD WATER	1-1/2 NPT 35 PSI (±5 PSI) @ 50°F	FLOW RATE: 60 GPM @ 50°F (±5°F)
A*	AIR	1/2 NPT 80-100 PSI (±5 PSI)	FLOW RATE: 6 CFM MAX. DEW POINT 42°F
NET*	ETHERNET	ETHERNET ACCESS TO INTERNET	DEDICATED LINE FOR DIAGNOSTICS
	HEAT LOSS	ENTRANCE	9000 BTU/HR
		SERVICE AREA	25000 BTU/HR
		AVERAGE CARTS	5000 BTU/HR
	WEIGHT	OPERATIONAL	6200-7800 LBS
		SHIPPING	6000-9000 LBS

HOT WATER TEMPERATURE: INCOMING WATER TEMPERATURES MAY BE INCREASED WITH OPTIONAL HEAT EXCHANGER.

COLD TAP WATER SYSTEM: COLD TAP WATER IS REQUIRED WITH THE FOLLOWING OPTIONS; COLD WATER PRE-WASH, NON-VENTED DRYING SYSTEM, VAPOR REMOVAL CONDENSER, AND DRAIN DISCHARGE COOL DOWN SYSTEM.

DRAIN CONNECTION: THE DRAIN CONNECTION MUST BE INSTALLED WITH AN AIR GAP BETWEEN THE MACHINE DISCHARGE PIPE AND THE FLOOR DRAIN.

EXHAUST CONNECTION: DUE TO THE VOLUME OF THE CONDENSING VAPOR, IT IS REQUIRED THAT THE DUCT WORK BE WELDED AND PITCHED TOWARDS THE MACHINE CHAMBER. ANY LOW POINTS WILL REQUIRE DRAIN LINES. A STAINLESS STEEL MATERIAL IS RECOMMENDED.

ALL STATED UTILITY PRESSURES AND FLOW RATES ARE GIVEN UNDER DYNAMIC LOAD CONDITIONS WHILE THE MACHINE IS IN OPERATION.

APPROVAL REQUIRED

LYNX WILL NOT MANUFACTURE WITHOUT RECEIVING CUSTOMER APPROVAL.

APPROVED WITHOUT COMMENT
 APPROVED AS NOTED
 NOT APPROVED - RESUBMIT

BY: _____ DATE: ___/___/___



ZURN SANI-FLOR MODEL Z-1950
 12 DIAMETER A.R.E. RECEPTOR
 4 PIPE SIZE, 8 SUMP DEPTH
 ANTI- SPLASH DOME STRAINER
 GRATE OR EQUAL

*** FINAL CONNECTIONS BY OTHERS THAN LYNX**

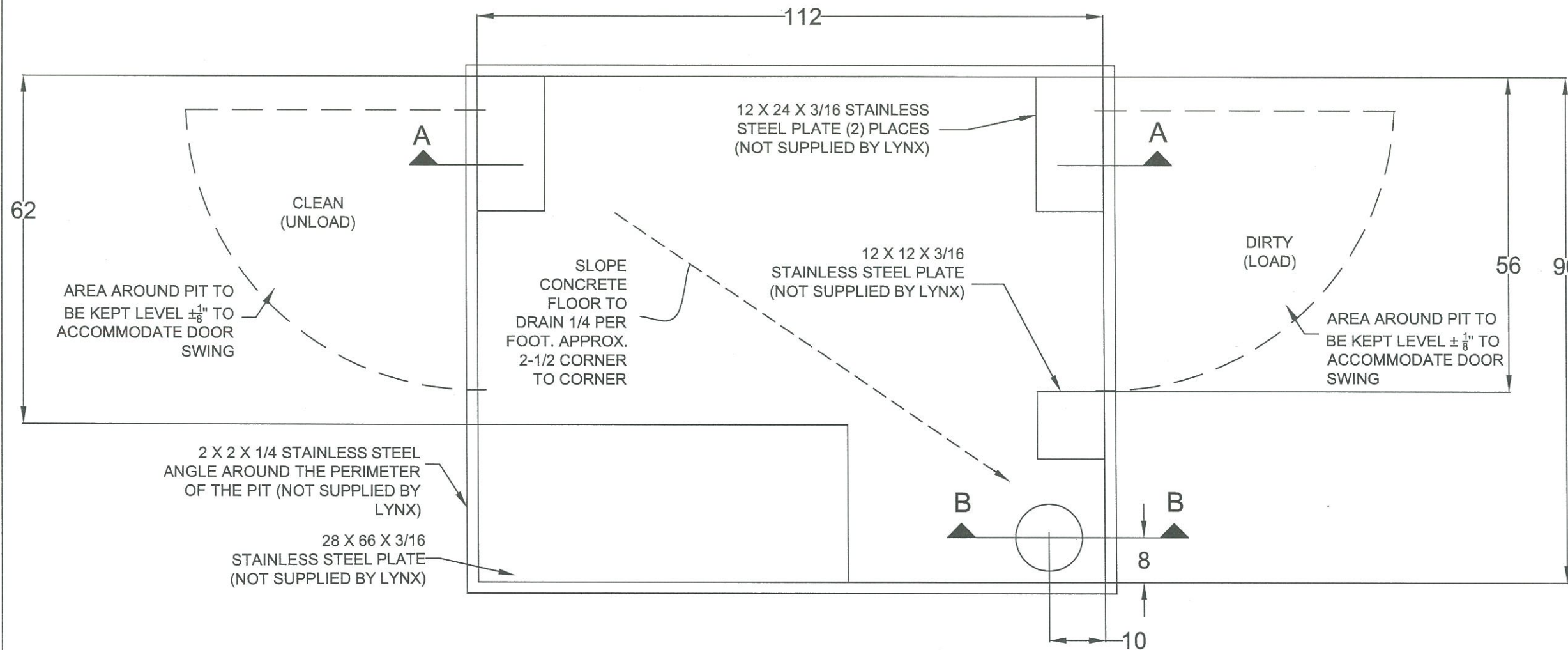
REVISIONS REV. ECO DESCRIPTION BY DATE				PROJECT MANAGER APPROVED BY: <i>[Signature]</i> DATE: 3/6/23		ENGINEERING APPROVED BY: <i>[Signature]</i> DATE: 3/6/23		THESE DRAWINGS ARE: <input checked="" type="checkbox"/> FOR APPROVAL <input type="checkbox"/> FOR RECORD ONLY <input type="checkbox"/> AS BUILT <input type="checkbox"/> PRELIMINARY		THIS DRAWING AND ANY PRINT THEREOF IS THE PROPERTY OF SPIRE INTEGRATED SOLUTIONS AND IS SUBJECT TO RETURN ON REQUEST OF THE COMPANY. THE INFORMATION SHOWN IS CONFIDENTIAL AND THE RECIPIENT BY ACCEPTING THIS DRAWING AGREES NOT TO USE ANY INFORMATION CONTAINED THEREON IN ANY MANNER WHICH WILL BE DETRIMENTAL TO SPIRE INTEGRATED SOLUTIONS		DRAWN BY: jtrank DATE: 3/6/2023 SHEET: 2 OF 2		JOB NO: 2998 SERIAL NO: 2998 SCALE:				CUSTOMER PO #:		DRAWING NUMBER: EQ110042137		REV: -	
				CUSTOMER INFO: Montana State University Leon Johnson Hall; 6th & Grant Street - MSU Campus Bozeman, MT		FLOOR: ROOM:																	
				TITLE: Lynx Cage & Rack Washer		MODEL(S): 410LX		SIZE: 46W x 85H x 92L															

APPROVAL REQUIRED

SPIRE WILL NOT MANUFACTURE WITHOUT RECEIVING CUSTOMER APPROVAL.

APPROVED WITHOUT COMMENT
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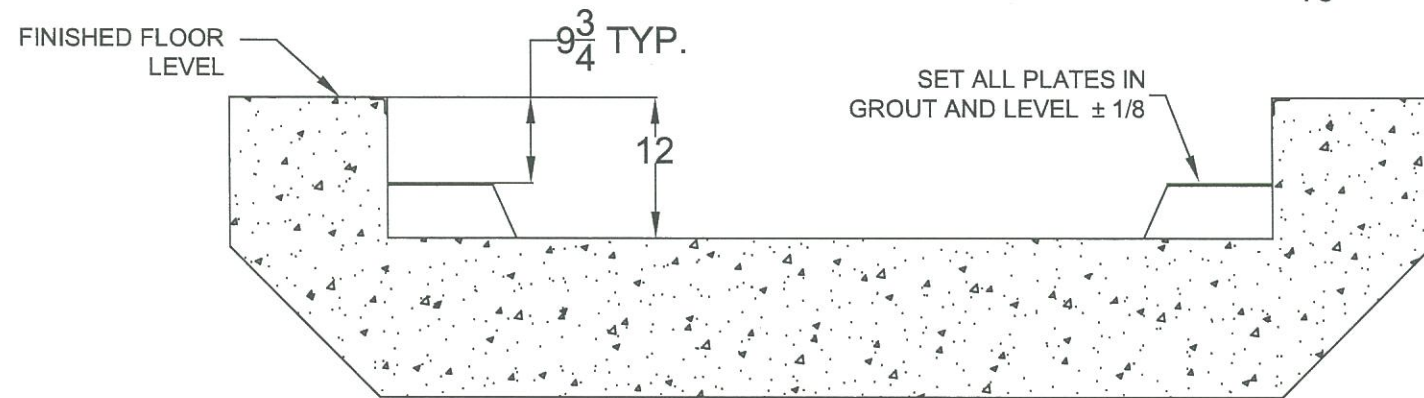
BY: _____ DATE: ___/___/___



NOTE:

1) ALL LABOR AND MATERIAL FOR CONSTRUCTION OF PIT TO BE SUPPLIED BY OTHERS THAN LYNX PRODUCT GROUP

2) SET THE TOP OF THE FIRST PAD 9 3/4 BELOW THE HIGHEST SPOT ON THE FINISHED FLOOR AROUND THE PERIMETER OF THE PIT. SET THE REMAINING PADS LEVEL WITH THIS FIRST PAD.



SECTION A-A



ZURN SINI-FLOOR MODEL Z-1950
 12 DIAMETER A.R.E. RECEPTOR
 4 PIPE SIZE, 8 SUMP DEPTH
 ANTI- SPLASH DOME STRAINER
 GRATE OR EQUAL

SECTION B-B

REV.	ECO	DESCRIPTION	BY	DATE

PROJECT MANAGER		ENGINEERING	
APPROVED BY: <i>[Signature]</i>	DATE: 3/6/23	APPROVED BY: <i>[Signature]</i>	DATE: 3/6/23
CUSTOMER INFO: Montana State University Leon Johnson Hall; 6th & Grant Street - MSU Campus Bozeman, MT		FLOOR:	ROOM:
TITLE: Lynx Cage & Rack Washer - Pit Detail	MODEL(S): 410LX	SIZE: 46W x 85H x 92L	

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AS BUILT

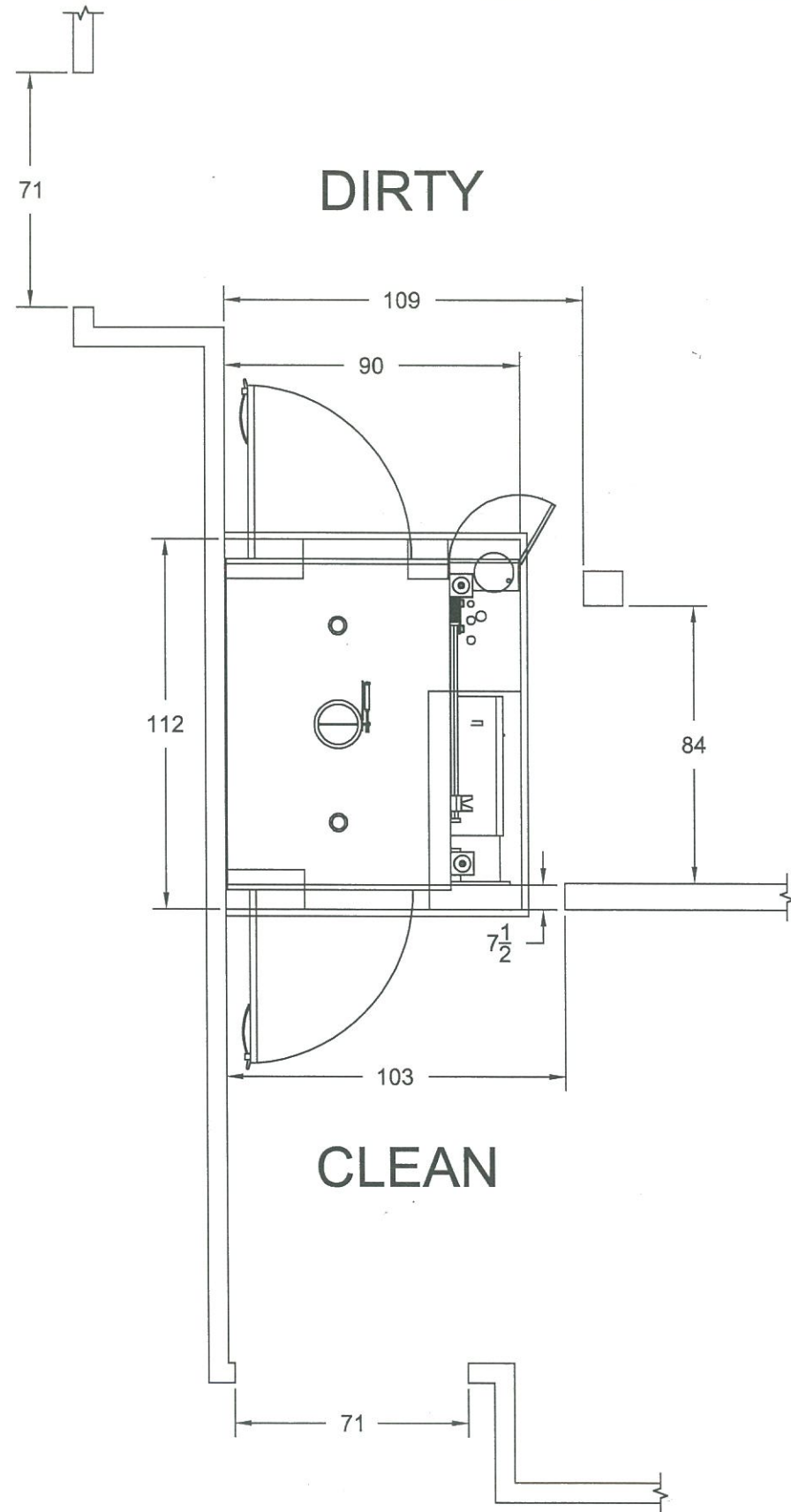
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CUSTOMER PO #:

DRAWN BY: jtrank	JOB NO: 2998
DATE: 3/6/2023	SERIAL NO: 2998
SHEET: 1 OF 1	SCALE:
DRAWING NUMBER:	





REVISIONS					PROJECT MANAGER		ENGINEERING		THESE DRAWINGS ARE:		DRAWN BY:		JOB NO:		
REV.	ECO	DESCRIPTION	BY	DATE	APPROVED BY:	DATE:	APPROVED BY:	DATE:	<input checked="" type="checkbox"/> FOR APPROVAL	<input type="checkbox"/> FOR RECORD ONLY	<input type="checkbox"/> AS BUILT	<input type="checkbox"/> PRELIMINARY	DATE:	SERIAL NO:	
					<i>[Signature]</i>	3/6/23	<i>[Signature]</i>	3/6/23					3/6/2023	2998	N.T.S.
					CUSTOMER INFO: Montana State University Leon Johnson Hall, 6th & Grant Street - MSU Campus Bozeman, MT 59717		BUILDING INFO:				CUSTOMER PO #:		DRAWING NUMBER:		REV:
					TITLE: Room Layout		MODEL(S):		SIZE:				RL111042139		-

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