

PROJECT MANUAL FOR:

Stadium Video Board Upgrade

MONTANA STATE UNIVERSITY
BOZEMAN, MONTANA

April 21, 2023

PPA No. 22-0611



**MONTANA
STATE UNIVERSITY**

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

Division 05 – METALS

- SECTION 05 12 00 - STRUCTURAL STEEL FRAMING
- SECTION 05 40 00 - COLD FORMED METAL FRAMING
- SECTION 05 50 00 – METAL FABRICATIONS
- SECTION 05 52 13 – PIPE AND TUBE RAILINGS
- SECTION 05 53 13 – BAR GRATINGS

Division 07 – THERMAL AND MOISTURE PROTECTION

- SECTION 07 41 13.16 – METAL PLATE WALL PANELS

Division 09 – FINISHES

- SECTION 09 96 00 – HIGH PERFORMANCE COATINGS

Division 10 – SPECIALTIES

- SECTION 10 75 00 – FLAGPOLES

Division 26 - ELECTRICAL

- SECTION 26 00 10 - GENERAL ELECTRICAL REQUIREMENTS
- SECTION 26 05 05 – SELECTIVE DEMOLITION OF ELECTRICAL SYSTEMS
- SECTION 26 05 19 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES
- SECTION 26 05 26 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS
- SECTION 26 05 29 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS
- SECTION 26 05 33 - RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS
- SECTION 26 05 44 - SLEEVES AND SLEEVE SEALS FOR ELECTRICAL RACEWAYS AND

CABLING

- SECTION 26 05 48.16 - SEISMIC CONTROLS FOR ELECTRICAL SYSTEMS
- SECTION 26 05 53 – IDENTIFICATION FOR ELECTRICAL SYSTEMS
- SECTION 26 22 13 - LOW-VOLTAGE DISTRIBUTION TRANSFORMERS
- SECTION 26 24 16 – PANELBOARDS
- SECTION 26 27 26 - WIRING DEVICES

CONSTRUCTION DRAWINGS

- 0.0 Cover Sheet
- SD1.0 Demo FDN/Slab Plan
- SD1.1 Demo Elevation
- S0.0 General Structural Notes
- S0.1 Structural Special Inspections
- S1.0 Foundation/Slab Plan
- S1.1 Catwalk Plan
- S1.2 Roof Plan
- S1.3 Elevations
- S3.0 Foundation Details
- S4.0 Framing Details
- S4.1 Framing Details
- A1.0 Exterior Elevations and Details
- E001 Electrical notes and legends
- E002 Electrical details and schedules
- E100 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

The drawings and specifications for this project have been submitted to the city of Bozeman for review. The contractor will pay all permit fees. The owner shall pay for plan review fee and the impact fee required for this project. The building permit must be appropriately displayed at the project site before construction may begin. The contractor shall contact the city of Bozeman for further clarification at the following:

CITY OF BOZEMAN
BUILDING INSPECTION DIVISION
DEPARTMENT OF PUBLIC
WORKS 20 EAST OLIVE STREET,
SUITE 208 PO BOX 640
BOZEMAN, MONTANA
59771-0640 (406) 582-2300

BUILDING PERMIT



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

INVITATION TO BID

Sealed bids will be received until **2:00 PM** on **Tuesday, May 23, 2023**, and will be publicly opened and read aloud in the offices of **MSU University Facilities Management, Plew Building, 6th & Grant, Bozeman, Montana**, for: **Stadium Videoboard Upgrade, PPA No. 22-0611**.

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 Monday, May 8, 2023, AT 10:00 AM PARTICIPANTS SHOULD MEET AT: Bobcat Stadium, Corner of S 11th Avenue and Kagy Blvd, at the Sonny Holland Statue, in front of the Bobcat Athletic Complex, Bozeman, MT 59718. 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 **AUGUST 1, 2023**.

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:

**Ara Meskiman, Project Manager
Montana State University
University Facilities Management
6th and Grant, PO Box 172760
Bozeman, Montana 59717-2760 Ph:
406/994-3230; 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: **Stadium Videoboard Upgrade**
Location: **Montana State University Bozeman Campus**
MSU PPA Project Number: **22-0611**
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 Services. 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 **by August 1, 2023**.
- 17.2. Actual damages may be assessed pursuant to the General Conditions. The Contractor acknowledges and understands that the Owner may suffer loss for every day of delay Final Acceptance is not achieved. Nothing contained in this waiver of liquidated damages shall be MSU Instructions to Bidders 2020 Page 7 of 7 deemed to preclude an award of actual damages in accordance with Paragraphs 4.3 through 4.6 of the General Conditions of the Contract for Construction.

~END OF INSTRUCTIONS~



UNIVERSITY FACILITIES MANAGEMENT

Sixth Avenue and Grant Street • PO Box 172760 •
Bozeman, Montana 59717-2760

Phone: (406) 994-5413 • Fax: (406) 994-5665

BID PROPOSAL

**Stadium Videoboard Upgrade
PPA No. 22-0611**

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 **Morrison Maierle 2880 Technology Blvd W Bozeman, MT 59718 406-587-0721**, 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)

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: _____

Continued next page

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 inspection 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 acknowledgment 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

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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.

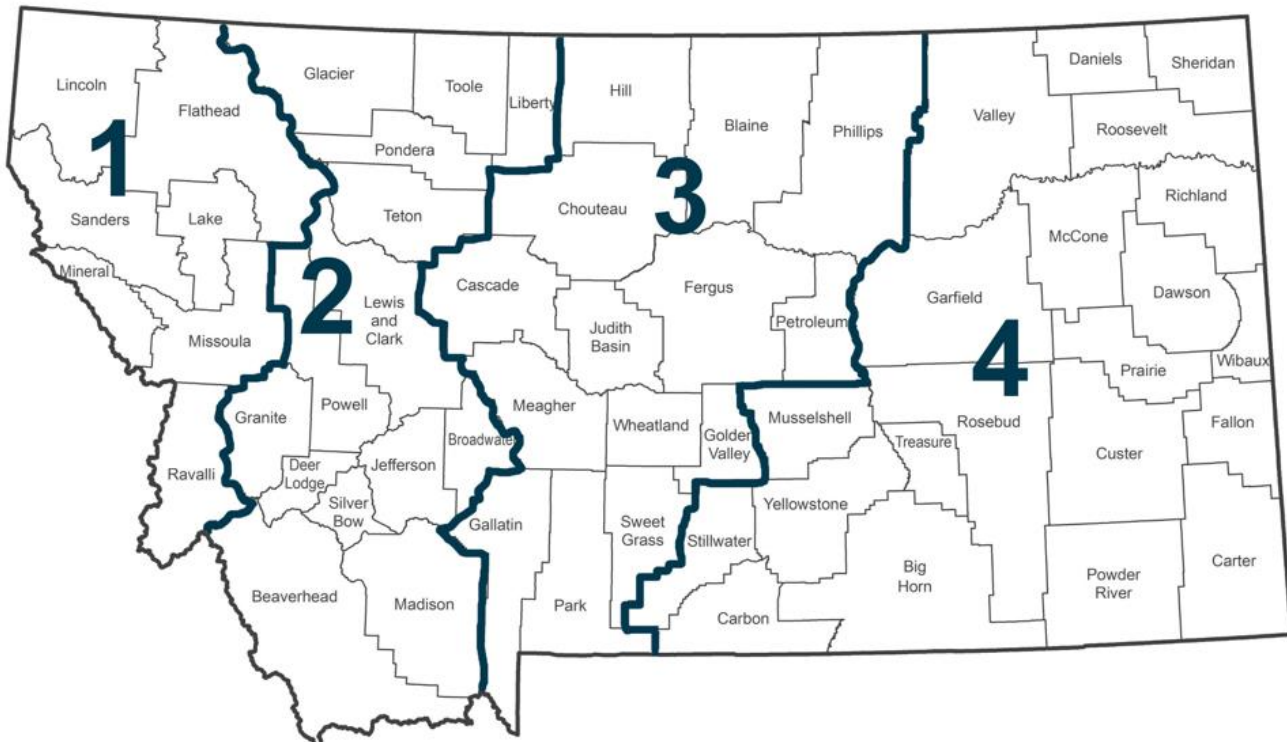
(2) The fringe benefit fund, plan, or program described in subsection (1)(b) must provide benefits to workers or employees for health care, pensions on retirement or death, life insurance, disability and sickness insurance, or bona fide programs that meet the requirements of the Employee Retirement Income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

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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

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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.

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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.

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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.

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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.

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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.

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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.

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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.

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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.

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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).

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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.

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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.

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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.

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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 (Grademán); 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.

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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.

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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.

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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

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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.

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FLOOR LAYERS

No Rate Established

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

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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

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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.

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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.

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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

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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

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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.

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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

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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.

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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

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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.

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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.

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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.

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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

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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

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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

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TAPERS

No Rate Established

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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

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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

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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.

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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.

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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. Replacement and upgrade of the MSU Bobcat Stadium Scoreboard and Video board. Work to include demolition of the existing scoreboard to be replaced with a new larger video board and scoreboard provided by Daktronics. Project will include installation of two new foundation footing with helical piers (8) total helical piers, (2) new steel columns to match the existing columns, new anchors and anchor rods supporting the existing columns, (4) new steel catwalk system, new ladder access to the catwalks, then new audio cabinets and catwalk roof on top of the scoreboard. Additionally the project will included new electrical elements to support the power requirements of the new video board.

C. Site Information

1. Scope of work includes, but is not necessarily limited to, the area on the south side or the new Bobcat Athletic Complex and to the north of the football field. All work shall take place on the asphalt pavement between the building and field. The field and building shall be protected throughout the entire project.

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

1. The work will be conducted in 1 phase to provide the least possible interference to the activities of the Owner's personnel and activities.
2. The Contractor will have access to site from the date of receipt of the contract.

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 part 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 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".
 - h. 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 Division 1 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

DI. 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 016000 - 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 016000

**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 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 of 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 017419
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 017419
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 017419

**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-resistant 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.

G. 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.
- di. 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.
- d. 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.
- CI. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.
- CII. 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.

DI. Storage or sale of removed items or materials on-site is not permitted.

DII. Utility Service: Maintain existing utilities and the protection facilities indicated to remain in 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 Waste "Construction 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 033000 - CAST-IN-PLACE CONCRETE

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 cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.
- B. Related Requirements:
 - 1. Section 312000 "Earth Moving" for drainage fill under slabs-on-grade.

1.3 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash, slag cement, other pozzolans, and silica fume; materials subject to compliance with requirements.
- B. W/C Ratio: The ratio by weight of water to cementitious materials.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site. Include any contractors performing work in Section 03 35 43 "Polished Concrete".
 - 1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
 - a. Contractor's superintendent.
 - b. Independent testing agency responsible for concrete design mixtures.
 - c. Ready-mix concrete manufacturer.
 - d. Concrete Subcontractor.
 - e. Special concrete finish Subcontractor.
 - 2. Review special inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, construction contraction and isolation joints, and joint-filler strips, semirigid joint fillers, forms and form removal limitations, vapor-retarder installation, anchor rod and anchorage device installation tolerances, steel reinforcement installation, methods for achieving specified floor and slab flatness and levelness floor and slab flatness and levelness measurement, concrete repair procedures, and concrete protection.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Sustainable Design Submittals:
 - 1. Product Data: For recycled content, indicating postconsumer and preconsumer recycled content and cost.
 - 2. Product Certificates: For regional materials, indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include distance to Project and cost for each regional material.
 - 3. Laboratory Test Reports: For liquid floor treatments and curing and sealing compounds, indicating compliance with requirements for low-emitting materials.
- C. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
 - 1. Indicate amounts of mixing water to be withheld for later addition at Project site.
- D. Steel Reinforcement Shop Drawings: Placing Drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.
- E. Construction/Control/Isolation Joint Layout: Indicate proposed overall pour sequence and locations for all concrete work as well as any changes to the indicated construction, control, and isolation joints required to construct the structure.
 - 1. Location of all joints is subject to approval of the Architect/Engineer.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For manufacturer.
- B. Welding certificates.
- C. Material Certificates: For each of the following, signed by manufacturers:
 - 1. Cementitious materials.
 - 2. Admixtures.
 - 3. Form materials and form-release agents.
 - 4. Steel reinforcement and accessories.
 - 5. Curing compounds.
 - 6. Floor and slab treatments.
 - 7. Bonding Adhesives.
 - 8. Semirigid joint filler.
 - 9. Joint-filler strips.
 - 10. Repair materials.
- D. Material Test Reports: For the following, from a qualified testing agency:
 - 1. Aggregates: Include service record data indicating absence of deleterious expansion of concrete due to alkali aggregate reactivity.
- E. Floor surface flatness and levelness measurements indicating compliance with specified tolerances.

- F. Minutes of preinstallation conference.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.
- B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
 - 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- C. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
 - 1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
 - 2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician, Grade I. Testing agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician, Grade II.
- D. Welding Qualifications: Qualify procedures and personnel according to AWS D1.4/D 1.4M.
- E. Mockups: See Section 03 35 43 "Polished Concrete" for required cast concrete slab-on-grade panels to demonstrate typical joints, surface finish, texture, tolerances, floor treatments, and standard of workmanship.

1.8 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on concrete mixtures.

1.9 DELIVERY, STORAGE, AND HANDLING

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

1.10 FIELD CONDITIONS

- A. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
 - 1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
 - 2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.

3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
- B. Hot-Weather Placement: Comply with ACI 301 and as follows:
1. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

- A. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
1. ACI 301.
 2. ACI 117.

2.2 FORM-FACING MATERIALS

- A. Smooth-Formed Finished Concrete: Form-facing panels that provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
1. Plywood, metal, or other approved panel materials.
 2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:
- B. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum.
- C. Form-Release Agent: Commercially formulated form-release agent that does not bond with, stain, or adversely affect concrete surfaces and does not impair subsequent treatments of concrete surfaces.
1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
- D. Form Ties: Factory-fabricated, removable or snap-off glass-fiber-reinforced plastic or metal form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
1. Furnish units that leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.
 2. Furnish ties that, when removed, leave holes no larger than 1 inch in diameter in concrete surface.
 3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

2.3 STEEL REINFORCEMENT

- A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

- B. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.
- C. Low-Alloy-Steel Reinforcing Bars: ASTM A 706/A 706M, deformed.

2.4 REINFORCEMENT ACCESSORIES

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

2.5 CONCRETE MATERIALS

- A. Regional Materials: Concrete shall be manufactured within 500 miles of Project site from aggregates and cementitious materials that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of Project site.
- B. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.
- C. Cementitious Materials:
 - 1. Portland Cement: ASTM C 150/C 150M, Type I/II, gray.
 - 2. Fly Ash: ASTM C 618, Class F.
- D. Normal-Weight Aggregates: ASTM C 33/C 33M, Class 3S coarse aggregate or better, graded. Provide aggregates from a single source.
 - 1. Maximum Coarse-Aggregate Size: As indicated in the Drawings.
 - 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- E. Air-Entraining Admixture: ASTM C 260/C 260M.
- F. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
 - 1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
 - 2. Retarding Admixture: ASTM C 494/C 494M, Type B.
 - 3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
 - 4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
 - 5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
 - 6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.
- G. Water: ASTM C 94/C 94M and potable.

2.6 CURING MATERIALS

- A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

- B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.
- C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- D. Water: Potable.
- E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.

2.7 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork.
- B. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Type A shore durometer hardness of 80 according to ASTM D 2240.
- C. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements, and as follows:
 - 1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

2.8 REPAIR MATERIALS

- A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.
 - 1. Cement Binder: ASTM C 150/C 150M, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
 - 2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
 - 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by underlayment manufacturer.
 - 4. Compressive Strength: Not less than 4100 psi at 28 days when tested according to ASTM C 109/C 109M.
- B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch and that can be filled in over a scarified surface to match adjacent floor elevations.
 - 1. Cement Binder: ASTM C 150/C 150M, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
 - 2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
 - 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by topping manufacturer.
 - 4. Compressive Strength: Not less than 5000 psi at 28 days when tested according to ASTM C 109/C 109M.

2.9 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.
 - 1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.
- B. Cementitious Materials: At contractor's option, may use fly ash in mix designs. Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
 - 1. Fly Ash: 25 percent.
- C. Limit water-soluble, chloride-ion content in hardened concrete to 0.30 percent by weight of cement.
- D. Admixtures: Use admixtures according to manufacturer's written instructions.
 - 1. Use water-reducing, high-range water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
 - 2. Use water-reducing and -retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
 - 3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs, concrete required to be watertight, and concrete with a w/c ratio below 0.50.

2.10 CONCRETE MIXTURES FOR BUILDING ELEMENTS

- A. Footings: Normal-weight concrete.
 - 1. Minimum Compressive Strength: As indicated in the Drawings at 28 days.
 - 2. Maximum W/C Ratio: As indicated in the Drawings.
 - 3. Slump Limit: As indicated in the Drawings.
 - 4. Air Content: As indicated in the Drawings.
- B. Slabs-on-Grade: Normal-weight concrete.
 - 1. Minimum Compressive Strength: As indicated in the Drawings at 28 days.
 - 2. Maximum W/C Ratio: As indicated in the Drawings.
 - 3. Slump Limit: As indicated in the Drawings.
 - 4. Air Content: As indicated in the Drawings.
 - 5. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.

2.11 FABRICATING REINFORCEMENT

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

2.12 CONCRETE MIXING

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

PART 3 - EXECUTION

3.1 FORMWORK INSTALLATION

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C. Limit concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:
 - 1. Class A, 1/8 inch for smooth-formed finished surfaces.
- D. Construct forms tight enough to prevent loss of concrete mortar.
- E. Construct forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast-concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
 - 1. Install keyways, reglets, recesses, and the like, for easy removal.
 - 2. Do not use rust-stained steel form-facing material.
- F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.
- G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- H. Chamfer exterior corners and edges of permanently exposed concrete.
- I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.
- J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 EMBEDDED ITEM INSTALLATION

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC 303.

2. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
3. Install dovetail anchor slots in concrete structures as indicated.

3.3 REMOVING AND REUSING FORMS

- A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations, and curing and protection operations need to be maintained.
 1. Leave formwork for beam soffits, joists, slabs, and other structural elements that support weight of concrete in place until concrete has achieved its 28-day design compressive strength.
 2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.
- B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material are not acceptable for exposed surfaces. Apply new form-release agent.
- C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.4 STEEL REINFORCEMENT INSTALLATION

- A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that reduce bond to concrete.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.
 1. Weld reinforcing bars according to AWS D1.4/D 1.4M, where indicated.
- D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- E. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- F. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
 1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
 2. Form keyed joints where indicated. Embed keys at least 1-1/2 inches into concrete.
 3. Locate joints for slabs-on-deck as indicated.

4. Space vertical joints in walls as indicated. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
 5. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- G. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated within 7 hours of final floating. Construct contraction joint as indicated and as follows:
1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
 2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch-wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
- H. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated.
 2. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface where joint sealants, specified in Section 07 92 00 "Joint Sealants," are indicated.
 3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

3.5 CONCRETE PLACEMENT

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

1. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
2. Maintain reinforcement in position on chairs during concrete placement.
3. Screed slab surfaces with a straightedge and strike off to correct elevations.
4. Slope surfaces uniformly to drains where required.
5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

3.6 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
 1. Apply to concrete surfaces not exposed to public view.
- B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
 1. Apply to concrete surfaces exposed to public view.
- C. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.7 FINISHING SLABS

- A. General: Comply with ACI 302.1R recommendations for screeding, restraighening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power-driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraighening until surface is left with a uniform, smooth, granular texture.
 1. Apply float finish to surfaces to receive trowel finish.
- C. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

3.8 MISCELLANEOUS CONCRETE ITEM INSTALLATION

- A. Filling In: Fill in holes and openings left in concrete structures after work of other trades is in place unless otherwise indicated. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.
- B. Equipment Bases and Foundations:

1. Coordinate sizes and locations of concrete bases with actual equipment provided.
 2. Construct concrete bases 4 inches high unless otherwise indicated, and extend base not less than 6 inches in each direction beyond the maximum dimensions of supported equipment unless otherwise indicated or unless required for seismic anchor support.
 3. Minimum Compressive Strength: 4000 psi at 28 days.
 4. Install steel reinforcing to connect concrete base to concrete floor. Unless otherwise indicated, install at centers around the full perimeter of concrete base as indicated.
 5. Prior to pouring concrete, place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 6. Cast anchor-bolt insert into bases. Install anchor bolts to elevations required for proper attachment to supported equipment.
- C. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items. Cast-in inserts and accessories as shown on Drawings. Screed, tamp, and trowel finish concrete surfaces.

3.9 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for remainder of curing period.
- D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.
- E. Cure concrete slabs on grade and slabs on metal deck that are indicated to have a "polished finish" by the following method according to ACI 308.1:
1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
- F. Cure other concrete not included in the category above according to ACI 308.1, by one or a combination of the following methods:
1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven

days. Immediately repair any holes or tears during curing period, using cover material and waterproof tape.

- a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
 - b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
 - c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies does not interfere with bonding of floor covering used on Project.
3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
- a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound does not interfere with bonding of floor covering used on Project.

3.10 JOINT FILLING

- A. Prepare, clean, and install joint filler according to manufacturer's written instructions.
 1. Defer joint filling until concrete has aged at least one month. Do not fill joints until construction traffic has permanently ceased.
- B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joints clean and dry.
- C. Install joint filler full depth in saw-cut joints as indicated.

3.11 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.
- B. Patching Mortar: Mix dry-pack patching mortar, consisting of 1 part portland cement to 2-1/2 parts fine aggregate passing a No. 16 sieve, using only enough water for handling
- C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
 1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension to solid concrete. Limit cut depth to 3/4 inch. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
 2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar matches surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
 3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.

- D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
 2. After concrete has cured at least 14 days, correct high areas by grinding.
 3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
 4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
 5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
 6. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete, except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
 7. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.
- E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.
- F. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.12 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a special inspector and qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Inspections:
1. Steel reinforcement placement.
 2. Steel reinforcement welding.
 3. Headed bolts and studs.
 4. Verification of use of required design mixture.
 5. Concrete placement, including conveying and depositing.
 6. Curing procedures and maintenance of curing temperature.
 7. Verification of concrete strength before removal of shores and forms from beams and slabs.

- C. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172/C 172M shall be performed according to the following requirements:
1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.
 - a. When frequency of testing provides fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
 2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
 3. Air Content: ASTM C 231/C 231M, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 4. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F and below or 80 deg F and above, and one test for each composite sample.
 5. Compression Test Specimens: ASTM C 31/C 31M.
 - a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.
 - b. For elements requiring verification of strength before remove of shoring or supports, cast and field cure an additional two sets of two standard cylinder specimens for each composite sample.
 6. Compressive-Strength Tests: ASTM C 39/C 39M; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.
 - a. Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days.
 - b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
 7. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
 8. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
 9. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
 10. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
 11. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect.
 12. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
 13. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

- D. Measure floor and slab flatness and levelness according to ASTM E 1155 within 48 hours of finishing.

END OF SECTION 033000

SECTION 051200 - STRUCTURAL STEEL FRAMING

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. Structural steel.
 - 2. Grout.

1.3 DEFINITIONS

- A. Structural Steel: Elements of the structural frame indicated on Drawings and as described in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

1.4 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

1.5 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.6 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Show fabrication of structural-steel components.
 - 1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
 - 2. Include embedment Drawings.
 - 3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
 - 4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical, high-strength bolted connections.

5. Identify members and connections of the Seismic-Load-Resisting System.
6. Indicate locations and dimensions of protected zones.
7. Identify demand critical welds.

- C. Welding Procedure Specifications (WPSs) and Procedure Qualification Records (PQRs): Provide according to AWS D1.1/D1.1M, "Structural Welding Code - Steel," and, for SLRS members, according to AWS D1.8/D1.8M, for each welded joint whether prequalified or qualified by testing, including the following:
1. Power source (constant current or constant voltage).
 2. Electrode manufacturer and trade name, for demand critical welds.

1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer fabricator, professional engineer, and testing agency.
- B. Welding certificates.
- C. Mill test reports for structural steel, including chemical and physical properties.
1. Include Charpy V-Notch test results for heavy shapes according to AISC 360.
 2. Include Charpy V-Notch test results for heavy sections according to AISC 341 and 341s1.
- D. Product Test Reports: For the following:
1. Bolts, nuts, and washers including mechanical properties and chemical analysis.
 2. Direct-tension indicators.
 3. Tension-control, high-strength, bolt-nut-washer assemblies.
 4. Shear stud connectors.
 5. Shop primers.
 6. Nonshrink grout.

1.8 QUALITY ASSURANCE

- A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category STD.
- B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
1. Welders and welding operators performing work on bottom-flange, demand-critical welds shall pass the supplemental welder qualification testing, as required by AWS D1.8/D1.8M. FCAW-S and FCAW-G shall be considered separate processes for welding personnel qualification.
- C. Comply with applicable provisions of the following specifications and documents:
1. AISC 303.
 2. AISC 341 and AISC 341s1.
 3. AISC 360.
 4. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.
 - 1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.
- B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.
 - 1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.
 - 2. Clean and relubricate bolts and nuts that become dry or rusty before use.
 - 3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F 1852 fasteners and for retesting fasteners after lubrication.

PART 2 - PRODUCTS

2.1 STRUCTURAL-STEEL MATERIALS

- A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- B. W-Shapes: ASTM A 992.
- C. Channels, Angles, S-Shapes: ASTM A 36, ASTM A529, ASTM A572.
- D. Plate and Bar: ASTM A 36, unless indicated in general connection details as "Grade 50", then provided ASTM A572.
- E. Cold-Formed Hollow Structural Sections: ASTM A 500, Grade B, structural tubing.
- F. Steel Pipe: ASTM A 53, Type E or Type S, Grade B.
 - 1. Weight Class: As indicated in the Drawings.
 - 2. Finish: Black except where indicated to be galvanized.
- G. Steel Castings: ASTM A 216, Grade WCB with supplementary requirement S11.
- H. Welding Electrodes: Use E70XX electrodes unless indicated otherwise. Comply with AWS D1.1/D1.1M and AWS D1.8/D1.8M requirements.
 - 1. Welding electrodes for demand critical welds shall meet the Charpy V-Notch toughness requirements of AISC 341 and 341s1 section 7.3b and diffusible hydrogen level requirements of AWS 1.8/D1.8 M section 6.3.2.
- I. BOLTS, CONNECTORS, AND ANCHORS
- J. High-Strength Bolts, Nuts, and Washers: Unless indicated as "A325-SC" bolts, provide snug tightened ASTM A 325, Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade C, heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers; all with plain finish.

- K. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: At typical connections where bolts are indicated as "A325-SC", provide ASTM F 1852, Type 1, round head assemblies consisting of steel structural bolts with splined ends, heavy-hex carbon-steel nuts, and hardened carbon-steel washers.
 - 1. Finish: Plain.
- L. Shear Connectors: ASTM A 108, Grades 1015 through 1020, headed-stud type, cold-finished carbon steel; AWS D1.1/D1.1M, Type B.
- M. Headed or Unheaded Anchor Rods: ASTM F 1554, Grade 36 unless indicated as ASTM F 1554, Grade 55 (type S1, weldable), in the Drawings.
 - 1. Configuration: Straight.
 - 2. Nuts: ASTM A 563 heavy-hex carbon steel.
 - 3. Plate Washers: ASTM A 36/A 36M carbon steel.
 - 4. Washers: ASTM F 436, Type 1, hardened carbon steel.
 - 5. Finish: Plain.
- N. Threaded Rods: ASTM A 36/A 36M, unless indicated in the Drawings as "Grade 50" or "Gr. 50" then provide ASTM A 572/A 572M, Grade 50.
 - 1. Nuts: ASTM A 563 heavy-hex carbon steel.
 - 2. Washers: ASTM F 436, Type 1, hardened carbon steel.
 - 3. Finish: Plain.
- O. Clevises and Turnbuckles: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1035.
- P. Eye Bolts and Nuts: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1030.
- Q. Sleeve Nuts: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1018.

2.2 PRIMER

- A. Primer: Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat.

2.3 GROUT

- A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107/C 1107M, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time, minimum compressive strength of 7000 psi at 7 days.

2.4 FABRICATION

- A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," and to AISC 360.
 - 1. Camber structural-steel members where indicated.
 - 2. Fabricate beams with rolling camber up.
 - 3. Identify high-strength structural steel according to ASTM A 6/A 6M and maintain markings until structural steel has been erected.

4. Mark and match-mark materials for field assembly.
 5. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.
- B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.
1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1/D1.1M.
- C. Bolt Holes: Cut, drill, sub-punch, or punch standard bolt holes perpendicular to metal surfaces.
- D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.
- E. Cleaning: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP 2, "Hand Tool Cleaning."
- F. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.
- G. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel members.
1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
 2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
 3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.5 SHOP CONNECTIONS

- A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
1. Joint Type: Snug tightened unless noted as pretensioned or "SC", slip critical.
- B. Weld Connections: Comply with AWS D1.1/D1.1M and AWS D1.8/D1.8M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
1. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in AISC 303 for mill material.
 2. At building elements indicated for welds to comply with architecturally exposed structural steel (AESS) quality and appearance standards, use weld sizes, fabrication sequence, and equipment for AESS components that limit distortions to allowable tolerances.
 3. Provide continuous, sealed welds at angle to gusset-plate connections and similar locations where AESS quality welds are exposed to weather.
 4. Provide continuous welds of uniform size and profile where AESS quality welding is indicated.
 5. Make butt and groove welds flush to adjacent surfaces within tolerance of plus 1/16 inch, minus zero inch for AESS quality welding. Do not grind unless required for clearances or for fitting other components, or unless directed to correct unacceptable work.
 6. Remove backing bars or runoff tabs; back-gouge and grind steel smooth for AESS quality welding.
 7. At locations where welding on the far side of an exposed connection of AESS quality welding occurs, grind distortions and marking of the steel to a smooth profile aligned with adjacent material.

8. Make fillet welds for AESS quality welding of uniform size and profile with exposed face smooth and slightly concave. Do not grind unless directed to correct unacceptable work.

2.6 SHOP PRIMING

- A. Shop prime steel surfaces except the following:
 1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
 2. Surfaces to be field welded.
 3. Surfaces of high-strength bolted, slip-critical connections.
 4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
 5. Galvanized surfaces.
 6. Surfaces enclosed in interior construction.
- B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:
 1. SSPC-SP 2, "Hand Tool Cleaning."
- C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

2.7 SOURCE QUALITY CONTROL

- A. Testing Agency: Owner may engage a qualified testing agency to perform shop tests and inspections.
 1. If Owner chooses to engage a qualified testing agency, provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections. Owner reserves the right to perform inspections at the project site after delivery of fabricated materials.
- B. Bolted Connections: Inspect and test shop-bolted connections according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- C. Welded Connections: Visually inspect shop-welded connections according to AWS D1.1/D1.1M and as indicated in the Statement of Special Inspection included in the drawings.
 1. In addition to visual inspection, shop welds will be tested and inspected according to AWS D1.1/D1.1M, AWS D1.8/D1.8M, and the following inspection procedures, at testing agency's option:
 - a. Partial Joint Penetration Welds: One spot test per weld using magnetic particle inspection, according to ASTM E 709, or ultrasonic inspection, according to ASTM E 164. Test at least 4 inches of weld length. If flaws are detected, test two additional spots in the weld. If additional flaws are detected, test entire length of all welds in the joint.
 - b. Complete Joint Penetration Welds: Test full length of weld using ultrasonic inspection, according to ASTM E 164.
- D. In addition to visual inspection, test and inspect shop-welded shear connectors according to requirements in AWS D1.1/D1.1M for stud welding and as follows:
 1. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.

2. Conduct tests according to requirements in AWS D1.1/D1.1M on additional shear connectors if weld fracture occurs on shear connectors already tested.
- E. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify, with certified steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.
1. Prepare a certified survey of existing conditions. Include bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.

3.3 ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.
- B. Baseplates, Bearing Plates and Leveling Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.
1. Set plates for structural members on wedges, shims, or setting nuts as required.
 2. Weld plate washers where indicated to top of baseplate.
 3. At the Special Moment Frame column baseplates, if setting/leveling nuts are used, shim with steel and back-off leveling nuts prior to snug tightening anchor rods and grouting below baseplate.
 4. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
 5. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.
- C. Maintain erection tolerances of structural steel within AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."
- D. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that are in

permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

1. Level and plumb individual members of structure.
2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.

- E. Splice members only where indicated.
- F. Do not use thermal cutting during erection unless approved by Architect. Finish thermally cut sections within smoothness limits in AWS D1.1/D1.1M.
- G. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.
- H. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.

3.4 FIELD CONNECTIONS

- A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
 1. Joint Type: Snug tightened unless noted as pretensioned or "SC", slip critical.
- B. Weld Connections: Comply with AWS D1.1/D1.1M and AWS D1.8/D1.8M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
 1. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
 2. Remove backing bars or runoff tabs where indicated, back gouge, and grind steel smooth.
 3. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," for mill material.
 4. At building elements indicated for welds to comply with architecturally exposed structural steel (AESS) quality and appearance standards, use weld sizes, fabrication sequence, and equipment for AESS components that limit distortions to allowable tolerances.
 5. Provide continuous, sealed welds at angle to gusset-plate connections and similar locations where AESS quality welds are exposed to weather.
 6. Provide continuous welds of uniform size and profile where AESS quality welding is indicated.
 7. Make butt and groove welds flush to adjacent surfaces within tolerance of plus 1/16 inch, minus zero inch for AESS quality welding. Do not grind unless required for clearances or for fitting other components, or unless directed to correct unacceptable work.
 8. Remove backing bars or runoff tabs; back-gouge and grind steel smooth for AESS quality welding.
 9. At locations where welding on the far side of an exposed connection of AESS quality welding occurs, grind distortions and marking of the steel to a smooth profile aligned with adjacent material.
 10. Make fillet welds for AESS quality welding of uniform size and profile with exposed face smooth and slightly concave. Do not grind unless directed to correct unacceptable work.

3.5 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:
 - 1. Verify structural-steel materials and inspect steel frame joint details.
 - 2. Verify weld materials and inspect welds.
 - 3. Verify connection materials and inspect high-strength bolted connections.
- B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- C. Bolted Connections: Inspect and test bolted connections according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- D. Welded Connections: Visually inspect shop-welded connections according to AWS D1.1/D1.1M and as indicated in the Statement of Special Inspection included in the drawings.
- E. In addition to visual inspection, test and inspect field-welded shear connectors according to requirements in AWS D1.1/D1.1M for stud welding and as follows:
 - 1. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
 - 2. Conduct tests according to requirements in AWS D1.1/D1.1M on additional shear connectors if weld fracture occurs on shear connectors already tested.

3.6 REPAIRS AND PROTECTION

- A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing and repair galvanizing to comply with ASTM A 780/A 780M.
- B. Touchup Painting: Immediately after erection, clean exposed areas where primer is damaged or missing and paint with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - 1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.
- C. Permanently mark all Protected Zones.

END OF SECTION 051200

SECTION 054000 - COLD-FORMED METAL FRAMING

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. Exterior non-load-bearing wall framing
- B. Related Requirements:
 - 1. Section 092216 "Non-Structural Metal Framing" for standard, interior non-load-bearing, metal-stud framing, with height limitations and ceiling-suspension assemblies.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Sustainable Design Submittals:
 - 1. Product Data: For recycled content, indicating postconsumer and preconsumer recycled content and cost.
- C. Shop Drawings:
 - 1. Include layout, spacings, sizes, thicknesses, and types of cold-formed steel framing; fabrication; and fastening and anchorage details, including mechanical fasteners.
 - 2. Indicate reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.

1.5 INFORMATIONAL SUBMITTALS

- A. Welding certificates.
- B. Product Certificates: For each type of code-compliance certification for studs and tracks.
- C. Product Test Reports: For each listed product, for tests performed by manufacturer and witnessed by a qualified testing agency.
 - 1. Steel sheet.
 - 2. Expansion anchors.
 - 3. Power-actuated anchors.
 - 4. Mechanical fasteners.

5. Vertical deflection clips.
6. Horizontal drift deflection clips
7. Miscellaneous structural clips and accessories.

- D. Evaluation Reports: For nonstandard cold-formed steel framing post-installed anchors and power-actuated fasteners, from ICC-ES or other qualified testing agency acceptable to authorities having jurisdiction.

1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.
- B. Product Tests: Mill certificates or data from a qualified independent testing agency indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.
- C. Code-Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified according to the product-certification program of the Steel Stud Manufacturers Association.
- D. Welding Qualifications: Qualify procedures and personnel according to the following:
1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. 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:
1. ClarkWestern Building Systems, Inc.
 2. Dietrich Metal Framing; a Worthington Industries company.
 3. SCAFCO Corporation.
 4. Steel Network, Inc. (The).
 5. Steeler, Inc.

2.2 PERFORMANCE REQUIREMENTS

- A. Cold-Formed Steel Framing Standards: Unless more stringent requirements are indicated, framing shall comply with AISI S100, AISI S200, and the following:
1. Wall Studs: AISI S211.
 2. Headers: AISI S212.
 3. Lateral Design: AISI S213.

2.3 COLD-FORMED STEEL FRAMING MATERIALS

- A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- B. Steel Sheet: ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of grade and coating designation as follows:

1. Grade: ST33H.
 2. Coating: G90,
- C. Steel Sheet for Vertical Deflection, Drift Clips: ASTM A 653/A 653M, structural steel, zinc coated, of grade and coating as follows:
1. Grade: 33 50, Class 1 as required by structural performance.
 2. Coating: G90

2.4 EXTERIOR NON-LOAD-BEARING WALL FRAMING

- A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
1. Minimum Base-Metal Thickness: As indicated.
 2. Flange Width: As indicated.
 3. Section Properties: As indicated.
- B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:
1. Minimum Base-Metal Thickness: As indicated.
 2. Flange Width: 1-1/4 inches.
- C. Vertical Deflection Clips: Manufacturer's standard bypass or head clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.
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. ClarkWestern Building Systems, Inc.
 - b. Dietrich Metal Framing; a Worthington Industries company.
 - c. SCAFCO Corporation.
 - d. Steel Network, Inc. (The).
 - e. Steeler, Inc.
 - 2.
- D. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal loads and transfer them to the primary structure, and as follows:
1. Minimum Base-Metal Thickness: as indicated.
 2. Flange Width: 2-1/2" minimum.

2.5 FRAMING ACCESSORIES

- A. Fabricate steel-framing accessories from ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated steel sheet, of same grade and coating designation used for framing members.
- B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:
1. Supplementary framing.
 2. Bracing, bridging, and solid blocking.
 3. Web stiffeners.
 4. Anchor clips.
 5. End clips.

6. Foundation clips.
7. Gusset plates.
8. Stud kickers and knee braces.
9. Joist hangers and end closures.
10. Hole-reinforcing plates.
11. Backer plates.

2.6 ANCHORS, CLIPS, AND FASTENERS

- A. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123/A 123M.
- B. Power-Actuated Anchors: Fastener systems with working capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.
- C. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping, steel drill screws.
 1. Head Type: Low-profile head beneath sheathing; manufacturer's standard elsewhere.
- D. Welding Electrodes: Comply with AWS standards, use E60XX electrodes unless noted otherwise.

2.7 MISCELLANEOUS MATERIALS

- A. Galvanizing Repair Paint: ASTM A 780/A 780M.
- B. Nonmetallic, Nonshrink Grout: Factory-packaged, nonmetallic, noncorrosive, nonstaining grout, complying with ASTM C 1107/C 1107M, and with a fluid consistency and 30-minute working time.
- C. Shims: Load-bearing, high-density, multimonomer, nonleaching plastic; or cold-formed steel of same grade and metallic coating as framing members supported by shims.
- D. Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to match width of bottom track or rim track members as required.

2.8 FABRICATION

- A. Fabricate cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.
 1. Fabricate framing assemblies using jigs or templates.
 2. Cut framing members by sawing or shearing; do not torch cut.
 3. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, pneumatic pin fastening, or riveting as standard with fabricator. Wire tying of framing members is not permitted.
 - a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
 - b. Locate mechanical fasteners and install according to Shop Drawings, with screws penetrating joined members by no fewer than three exposed screw threads.

4. Fasten other materials to cold-formed steel framing by welding, bolting, pneumatic pin fastening, or screw fastening, according to Shop Drawings.
- B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies by means that prevent damage or permanent distortion.
- C. Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable variation of 1/8 inch in 10 feet and as follows:
 1. Spacing: Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
 2. Squareness: Fabricate each cold-formed steel framing assembly to a maximum out-of-square tolerance of 1/8 inch.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, conditions, and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Before sprayed fire-resistive materials are applied, attach continuous angles, supplementary framing, or tracks to structural members indicated to receive sprayed fire-resistive materials.
- B. After applying sprayed fire-resistive materials, remove only as much of these materials as needed to complete installation of cold-formed framing without reducing thickness of fire-resistive materials below that required to obtain fire-resistance ratings indicated. Protect remaining fire-resistive materials from damage.
- C. Install load-bearing shims or grout between the underside of load-bearing wall bottom track and the top of foundation wall or slab at locations with a gap larger than 1/4 inch to ensure a uniform bearing surface on supporting concrete or masonry construction.
- D. Install sealer gaskets at the underside of wall bottom track or rim track and at the top of foundation wall or slab at stud or joist locations.

3.3 INSTALLATION, GENERAL

- A. Cold-formed steel framing may be shop or field fabricated for installation, or it may be field assembled.
- B. Install cold-formed steel framing according to AISI S200, AISI S202, and manufacturer's written instructions unless more stringent requirements are indicated.
- C. Install shop- or field-fabricated, cold-formed framing and securely anchor to supporting structure.

1. Screw, bolt, or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16 inch.
- D. Install cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened.
 1. Cut framing members by sawing or shearing; do not torch cut.
 2. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.
 - a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
 - b. Locate mechanical fasteners, install according to Shop Drawings, and comply with requirements for spacing, edge distances, and screw penetration.
- E. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.
- F. Install temporary bracing and supports to secure framing and support loads equal to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.
- G. Do not bridge building expansion joints with cold-formed steel framing. Independently frame both sides of joints.
- H. Install insulation, specified in Section 07 21 00 "Thermal Insulation," in framing-assembly members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.
- I. Fasten hole-reinforcing plate over web penetrations that exceed size of manufacturer's approved or standard punched openings.

3.4 EXTERIOR NON-LOAD-BEARING WALL INSTALLATION

- A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure.
- B. Fasten both flanges of studs to top and bottom track unless otherwise indicated. Space studs as follows:
 1. Stud Spacing: As indicated on Drawings.
- C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.
- D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.
 1. Install single deep-leg deflection tracks and anchor to building structure.
 2. Install double deep-leg deflection tracks and anchor outer track to building structure.
 3. Connect vertical deflection clips to bypassing studs and anchor to building structure.
 4. Connect drift clips to cold-formed steel framing and anchor to building structure.
- E. Install horizontal bridging in wall studs, spaced vertically in rows indicated but not more than 48 inches apart. Fasten at each stud intersection.

1. Channel Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.
- F. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 12 inches of single deflection track. Install a combination of bridging and stud or stud-track solid blocking of width and thickness matching studs, secured to stud webs or flanges.
 1. Install solid blocking at 96-inch centers.
- G. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.5 ERECTION TOLERANCES

- A. Install cold-formed steel framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:
 1. Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.6 FIELD QUALITY CONTROL

- A. Testing: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Field and shop welds will be subject to testing and inspecting.
- C. Testing agency will report test results promptly and in writing to Contractor and Architect.
- D. Cold-formed steel framing will be considered defective if it does not pass tests and inspections.
- E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.7 REPAIRS AND PROTECTION

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel framing with galvanized repair paint according to ASTM A 780/A 780M and manufacturer's written instructions.
- B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that cold-formed steel framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION 054000

SECTION 055000 - METAL FABRICATIONS

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 ladders.
 - 2. Ladder safety cages.
- B. Related Requirements:
 - 1. Section 051200 "Structural Steel Framing."

1.3 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of metal fabrications that are anchored to or that receive other work. 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.

1.4 ACTION SUBMITTALS

- A. Shop Drawings: Show fabrication and installation details. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items. Provide Shop Drawings for the following:
 - 1. Metal ladders.
 - 2. Ladder safety cages.

1.5 INFORMATIONAL SUBMITTALS

- A. Mill Certificates: Signed by stainless-steel manufacturers, certifying that products furnished comply with requirements.
- B. Welding certificates.

1.6 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- B. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1.7 FIELD CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 METALS

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.
- B. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- C. Steel Tubing: ASTM A 500/A 500M, cold-formed steel tubing.
- D. Steel Pipe: ASTM A 53/A 53M, Standard Weight (Schedule 40) unless otherwise indicated.

2.2 FASTENERS

- A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.
- B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 325, Type 3 (ASTM A 325M, Type 3); with hex nuts, ASTM A 563, Grade C3 (ASTM A 563M, Class 8S3); and, where indicated, flat washers.
- C. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, ASTM F 593 (ASTM F 738M); with hex nuts, ASTM F 594 (ASTM F 836M); and, where indicated, flat washers;
- D. Anchor Bolts: ASTM F 1554, Grade 36, of dimensions indicated; with nuts, ASTM A 563 (ASTM A 563M); and, where indicated, flat washers.
- E. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors.
 - 1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5, unless otherwise indicated.

2. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 (A1) stainless-steel bolts, ASTM F 593 (ASTM F 738M), and nuts, ASTM F 594 (ASTM F 836M).

2.3 MISCELLANEOUS MATERIALS

- A. Shop Primers: Provide primers that comply with Section 099600 "High-Performance Coatings."
- B. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout

2.4 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- D. Form exposed work with accurate angles and surfaces and straight edges.
- E. Weld corners and seams continuously to comply with the following:
 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 2. Obtain fusion without undercut or overlap.
 3. Remove welding flux immediately.
 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.
- G. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
- I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

2.5 METAL LADDERS

- A. General:

1. Comply with ANSI A14.3.

B. Steel Ladders:

1. Space siderails 18 inches (457 mm) apart unless otherwise indicated.
2. Siderails: Continuous, 3" x 12" steel flat bars, with eased edges.
3. Rungs: 7/8" diameter steel bars.
4. Fit rungs in centerline of siderails; plug-weld and grind smooth on outer rail faces.
5. Support each ladder as indicated.
6. Prime exterior ladders, including brackets and fasteners, with primer specified in Section 099600 "High-Performance Coatings."
7. Provide Cotterman safety gate at the top of all ladders.

2.6 LADDER SAFETY CAGES

A. General:

1. Fabricate ladder safety cages to comply with ANSI A14.3. Assemble by welding or with stainless-steel fasteners.
2. Provide primary hoops at tops and bottoms of cages and spaced not more than 20 feet (6 m) o.c. Provide secondary intermediate hoops spaced not more than 48 inches (1200 mm) o.c. between primary hoops.
3. Fasten assembled safety cage to ladder rails and adjacent construction by welding or with stainless-steel fasteners unless otherwise indicated.

B. Steel Ladder Safety Cages:

1. Primary Hoops: 1/4-by-4-inch (6.4-by-100-mm) flat bar hoops.
2. Secondary Intermediate Hoops: 1/4-by-2-inch (6.4-by-50-mm) flat bar hoops.
3. Vertical Bars: 3/16-by-1-1/2-inch (4.8-by-38-mm) flat bars secured to each hoop.
4. Prime ladder safety cages, including brackets and fasteners, with primer specified in Section 099600 "High-Performance Coatings."

2.7 FINISHES, GENERAL

A. Finish metal fabrications after assembly.

B. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

2.8 STEEL AND IRON FINISHES

A. Shop prime iron and steel items not indicated to be galvanized unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.

1. Shop prime with unless primers specified in Section 099600 "High-Performance Coatings" are indicated.

B. Preparation for Shop Priming: Prepare surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- C. Field Welding: Comply with the following requirements:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.

3.2 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - 1. Apply by brush or spray to provide a minimum 2.0-mil (0.05-mm) dry film thickness.
- B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Section 099113 "Exterior Painting."

END OF SECTION 055000

SECTION 055213 - PIPE AND TUBE RAILINGS

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. Steel pipe railings.

1.3 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of anchorages for railings. 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.
- C. Schedule installation so wall attachments are made only to completed walls. Do not support railings temporarily by any means that do not satisfy structural performance requirements.

1.4 ACTION SUBMITTALS

- A. Product Data: For the following:
 - 1. Manufacturer's product lines of mechanically connected railings.
 - 2. Railing brackets.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
- C. Samples: For each type of exposed finish required.
 - 1. Sections of each distinctly different linear railing member, including handrails, top rails, posts, and balusters.
 - 2. Fittings and brackets.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency.

- B. Welding certificates.
- C. Mill Certificates: Signed by manufacturers of stainless-steel products certifying that products furnished comply with requirements.
- D. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers certifying that shop primers are compatible with topcoats.
- E. Product Test Reports: For pipe and tube railings, for tests performed by a qualified testing agency, according to ASTM E 894 and ASTM E 935.

1.6 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

1.8 FIELD CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 METALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.
- B. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails unless otherwise indicated.
 - 1. Provide type of bracket with predrilled hole for exposed bolt anchorage and that provides 1-1/2-inch (38-mm) clearance from inside face of handrail to finished wall surface.

2.2 STEEL AND IRON

- A. Tubing: ASTM A 500 (cold formed) or ASTM A 513.
- B. Pipe: ASTM A 53/A 53M, Type F or Type S, Grade A, Standard Weight (Schedule 40), unless another grade and weight are required by structural loads.
- C. Plates, Shapes, and Bars: ASTM A 36/A 36M.

2.3 FASTENERS

- A. General: Provide the following:
 - 1. Ungalvanized-Steel Railings: Plated steel fasteners complying with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5 for zinc coating.
- B. Fasteners for Anchoring Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction indicated.
- C. Fasteners for Interconnecting Railing Components:
 - 1. Provide concealed fasteners for interconnecting railing components and for attaching them to other work, unless otherwise indicated.

2.4 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- B. Shop Primers: Provide primers that comply with Section 099600 "High-Performance Coatings."

2.5 FABRICATION

- A. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage.
- B. Shop assemble railings to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.
- C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- D. Form work true to line and level with accurate angles and surfaces.
- E. Fabricate connections that are exposed to weather in a manner that excludes water. Provide weep holes where water may accumulate.
- F. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.
- G. Connections: Fabricate railings with either welded or nonwelded connections unless otherwise indicated.
- H. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.

3. Remove flux immediately.
 4. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.
- I. Nonwelded Connections: Connect members with concealed mechanical fasteners and fittings. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.
1. Fabricate splice joints for field connection using an epoxy structural adhesive if this is manufacturer's standard splicing method.
- J. Form Changes in Direction as Follows:
1. By bending or by inserting prefabricated elbow fittings.
 2. By flush bends or by inserting prefabricated flush-elbow fittings.
 3. By radius bends of radius indicated or by inserting prefabricated elbow fittings of radius indicated.
- K. For changes in direction made by bending, use jigs to produce uniform curvature for each repetitive configuration required. Maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.
- L. Close exposed ends of railing members with prefabricated end fittings.
- M. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns unless clearance between end of rail and wall is 1/4 inch (6 mm) or less.
- N. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.
1. At brackets and fittings fastened to plaster or gypsum board partitions, provide crush-resistant fillers or other means to transfer loads through wall finishes to structural supports and prevent bracket or fitting rotation and crushing of substrate.
- O. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by railings. Coordinate anchorage devices with supporting structure.

2.6 STEEL AND IRON FINISHES

- A. For nongalvanized-steel railings, provide nongalvanized ferrous-metal fittings, brackets, fasteners, and sleeves; however, galvanize anchors to be embedded in exterior concrete or masonry.
- B. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
- C. Primer Application: Apply shop primer to prepared surfaces of railings unless otherwise indicated. Comply with requirements in SSPC-PA 1, "Shop, Field, and Maintenance Painting of Steel," for shop painting. Primer need not be applied to surfaces to be embedded in concrete or masonry.
1. Shop prime uncoated railings with unless primers specified in Section 099600 "High-Performance Coatings" are indicated.
 2. Do not apply primer to galvanized surfaces.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine plaster and gypsum board assemblies, where reinforced to receive anchors, to verify that locations of concealed reinforcements are clearly marked for Installer. Locate reinforcements and mark locations if not already done.

3.2 INSTALLATION, GENERAL

- A. Fit exposed connections together to form tight, hairline joints.
- B. Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.
 - 1. Do not weld, cut, or abrade surfaces of railing components that are coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
 - 2. Set posts plumb within a tolerance of 1/16 inch in 3 feet (2 mm in 1 m).
 - 3. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet (6 mm in 3.5 m).
- C. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.
 - 1. Coat, with a heavy coat of bituminous paint, concealed surfaces of aluminum that are in contact with grout, concrete, masonry, wood, or dissimilar metals.
- D. Adjust railings before anchoring to ensure matching alignment at abutting joints.
- E. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

3.3 RAILING CONNECTIONS

- A. Nonwelded Connections: Use mechanical or adhesive joints for permanently connecting railing components. Seal recessed holes of exposed locking screws using plastic cement filler colored to match finish of railings.
- B. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article whether welding is performed in the shop or in the field.

3.4 ANCHORING POSTS

- A. Anchor posts to metal surfaces with oval flanges, angle type, or floor type as required by conditions, connected to posts and to metal supporting members as follows:
 - 1. For steel pipe railings, weld flanges to post and bolt to metal supporting surfaces.
- B. Install removable railing sections, where indicated, in slip-fit metal sockets cast in concrete.

3.5 ATTACHING RAILINGS

- A. Anchor railing ends at walls with round flanges anchored to wall construction and welded to railing ends or connected to railing ends using nonwelded connections.
- B. Anchor railing ends to metal surfaces with flanges bolted to metal surfaces and welded to railing ends or connected to railing ends using nonwelded connections.
- C. Attach railings to wall with wall brackets, except where end flanges are used. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.
- D. Secure wall brackets and railing end flanges to building construction as follows:
 - 1. For steel-framed partitions, use self-tapping screws fastened to steel framing or to concealed steel reinforcements.
 - 2. For steel-framed partitions, use toggle bolts installed through flanges of steel framing or through concealed steel reinforcements.

3.6 ADJUSTING AND CLEANING

- A. Clean by washing thoroughly with clean water and soap and rinsing with clean water.
- B. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop painting to comply with SSPC-PA 1 requirements for touching up shop-painted surfaces.
 - 1. Apply by brush or spray to provide a minimum 2.0-mil (0.05-mm) dry film thickness.
- C. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Section 099600 "High-Performance Coatings."

3.7 PROTECTION

- A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.

END OF SECTION 055213

SECTION 055313 - BAR GRATINGS

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 metal bar gratings
- B. Related Requirements:
 - 1. Section 051200 "Structural Steel Framing" for structural-steel framing system components.
 - 2. Section 055213 "Pipe and Tube Railings" for metal pipe and tube handrails and railings.

1.3 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written instructions to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of anchorages for gratings, grating frames, and supports. 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.

1.4 ACTION SUBMITTALS

- A. Product Data: For the following:
 - 1. Clips and anchorage devices for gratings.
 - 2. Paint products.
- B. Shop Drawings: Include plans, sections, details, and attachments to other work.

1.5 INFORMATIONAL SUBMITTALS

- A. Mill Certificates: Signed by manufacturers of stainless steel certifying that products furnished comply with requirements.
- B. Welding certificates.
- C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers certifying that shop primers are compatible with topcoats.

1.6 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1.7 FIELD CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with gratings by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 METAL BAR GRATINGS

- A. Metal Bar Grating Standards: Comply with NAAMM MBG 531, "Metal Bar Grating Manual."
- B. Welded Steel Grating:
 - 1. Bearing Bar Spacing: 1-3/16 inches (30 mm) o.c.
 - 2. Bearing Bar Depth: 1-1/2 inches (38 mm).
 - 3. Bearing Bar Thickness: 3/16 inch (4.8 mm).
 - 4. Crossbar Spacing: 4 inches (102 mm) o.c.
 - 5. Grating Mark W-19-4 (1-1/2 x 3/16) STEEL: 1-1/2-by-3/16-inch bearing bars at 1-3/16 inches o.c., and crossbars at 4 inches
 - 6. Traffic Surface: Serrated.
 - 7. Steel Finish: Shop primed.

2.2 FERROUS METALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- B. Steel Bars for Bar Gratings: ASTM A 36/A 36M or steel strip, ASTM A 1011/A 1011M or ASTM A 1018/A 1018M.
- C. Wire Rod for Bar Grating Crossbars: ASTM A 510 (ASTM A 510M).

2.3 FASTENERS

- A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941 Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.
- B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A with hex nuts, ASTM A 563 and, where indicated, flat washers.
- C. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, nuts, and, where indicated, flat washers; ASTM F 593 for bolts and ASTM F 594 for nuts, Alloy

2.4 MISCELLANEOUS MATERIALS

- A. Shop Primers: Provide primers that comply with Section 099600 "High-Performance Coatings."
- B. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
 - 1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.
- C. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.
- D. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
- E. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.

2.5 FABRICATION

- A. Shop Assembly: Fabricate grating sections in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- B. Cut, drill, and punch material cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- C. Form from materials of size, thickness, and shapes indicated, but not less than that needed to support indicated loads.
- D. Fit exposed connections accurately together to form hairline joints.
- E. Welding: Comply with AWS recommendations and the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
- F. Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space the anchoring devices to secure gratings, frames, and supports rigidly in place and to support indicated loads.
 - 1. Fabricate toeplates to fit grating units and weld to units in shop unless otherwise indicated.
 - 2. Fabricate toeplates for attaching in the field.
 - 3. Toeplate Height: 4 inches (100 mm) unless otherwise indicated.
- G. Fabricate cutouts in grating sections for penetrations indicated. Arrange cutouts to permit grating removal without disturbing items penetrating gratings.
 - 1. Edge-band openings in grating that interrupt four or more bearing bars with bars of same size and material as bearing bars.

- H. Do not notch bearing bars at supports to maintain elevation.

2.6 GRATING FRAMES AND SUPPORTS

- A. Fabricate from metal shapes, plates, and bars of welded construction to sizes, shapes, and profiles indicated and as necessary to receive gratings. Miter and weld connections for perimeter angle frames. Cut, drill, and tap units to receive hardware and similar items.
 - 1. Unless otherwise indicated, fabricate from same basic metal as gratings.
 - 2. Equip units indicated to be cast into concrete or built into masonry with integrally welded anchors. Unless otherwise indicated, space anchors 24 inches (600 mm) o.c. and provide minimum anchor units in the form of steel straps 1-1/4 inches (32 mm) wide by 1/4 inch (6 mm) thick by 8 inches (200 mm) long.

2.7 STEEL FINISHES

- A. Finish gratings, frames, and supports after assembly.
- B. Shop prime gratings, frames, and supports unless otherwise indicated.
 - 1. Shop prime with primers specified in Section 099600 "High-Performance Coatings" are indicated.
- C. Preparation for Shop Priming: Prepare surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
- D. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing gratings to in-place construction. Include threaded fasteners for concrete and masonry inserts, through-bolts, lag bolts, and other connectors.
- B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing gratings. Set units accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.
- C. Provide temporary bracing or anchors in formwork for items that are to be built into concrete or masonry.
- D. Fit exposed connections accurately together to form hairline joints.
 - 1. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade the surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

- E. Attach toeplates to gratings by welding at locations indicated.
- F. Field Welding: Comply with AWS recommendations and the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
- G. Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.

3.2 INSTALLING METAL BAR GRATINGS

- A. General: Install gratings to comply with recommendations of referenced metal bar grating standards that apply to grating types and bar sizes indicated, including installation clearances and standard anchoring details.
- B. Attach removable units to supporting members with type and size of clips and fasteners indicated or, if not indicated, as recommended by grating manufacturer for type of installation conditions shown.
- C. Attach nonremovable units to supporting members by welding where both materials are same; otherwise, fasten by bolting as indicated above.

3.3 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint and paint exposed areas with same material as used for shop painting to comply with SSPC-PA 1 requirements for touching up shop-painted surfaces.
 - 1. Apply by brush or spray to provide a minimum 2.0-mil (0.05-mm) dry film thickness.
- B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."
- C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780/A 780M.

END OF SECTION 055313

SECTION 074213.16 - METAL PLATE WALL PANELS

PART 1 - GENERAL

1.1 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
1. Meet with Owner, Architect, Owner's insurer if applicable, metal panel Installer, metal panel manufacturer's representative, structural-support Installer, and installers whose work interfaces with or affects metal panels, including installers of doors, windows, and louvers.
 2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 3. Review methods and procedures related to metal panel installation, including manufacturer's written instructions.
 4. Examine support conditions for compliance with requirements, including alignment between and attachment to structural members.
 5. Review flashings, special siding details, wall penetrations, openings, and condition of other construction that affect metal panels.
 6. Review governing regulations and requirements for insurance, certificates, and tests and inspections if applicable.
 7. Review temporary protection requirements for metal panel assembly during and after installation.
 8. Review procedures for repair of metal panels damaged after installation.
 9. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.
- B. Shop Drawings:
1. Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment assembly, trim, flashings, closures, and accessories; and special details.
 2. Accessories: Include details of the flashing, trim, and anchorage, at a scale of not less than 1-1/2 inches per 12 inches.
- C. Samples for Initial Selection: For each type of metal panel indicated with factory-applied color finishes.
1. Include similar Samples of trim and accessories involving color selection.
- D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below.

1. Metal Panels: 12 inches long by actual panel width. Include fasteners, closures, and other metal panel accessories.

1.3 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: For each product, tests performed by a qualified testing agency.
- C. Field quality-control reports.
- D. Sample Warranties: For special warranties.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For metal panels to include in maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver components, metal panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.
- B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.
- C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.
- D. Retain strippable protective covering on metal panels during installation.

1.7 FIELD CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal panels to be performed according to manufacturers' written instructions and warranty requirements.

1.8 COORDINATION

- A. Coordinate metal panel installation with rain drainage work, flashing, trim, construction of soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.9 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.
1. Failures include, but are not limited to, the following:
 - a. Structural failures including rupturing, cracking, or puncturing.
 - b. Deterioration of metals and other materials beyond normal weathering.
 2. Warranty Period: One year from date of Substantial Completion.
- B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Hunter units when tested according to ASTM D2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Metal Plate Wall Panel Assemblies: Comply with performance requirements without failure due to defective manufacturing, fabrication, installation, or other construction defects.
- B. Design, fabricate, and erect a dry joint, pressure equalized rainscreen aluminum wall panel system without use of sealants, gaskets, or butyl tape, tested as installed in compliance with AAMA 508, and as follows:
1. Cyclic Static Air Pressure Differential: Pass cycled pressure loading at 25 psf in 100 three-second cycles in accordance with ASTM E1233.
 2. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E330:
 - a. Wind Loads: As indicated on Drawings.
 - b. Other Design Loads: As indicated on Drawings.
 3. Air Infiltration: Air leakage of not more than 0.06 cfm/sq. ft. when tested according to ASTM E283 at the following test-pressure difference:
 - a. Test-Pressure Difference: 1.57 lbf/sq. ft.
 4. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E331 at the following test-pressure difference:
 - a. Test-Pressure Difference: 2.86 lbf/sq. ft.
- C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

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

2.2 METAL PLATE WALL PANELS

- A. Metal Plate Wall Panels: Provide factory-formed, metal plate wall panels fabricated from single sheets of metal formed into profile for installation method indicated. Include attachment assembly components, and accessories required for weathertight system.
 1. Basis of Design Product: Subject to compliance with requirements, provide DriDesign EN-V Aluminum Wall Panel System.
 2. Substitutions: See Division 01 Section "Substitution Procedures."
- B. Aluminum Plate: Alloy and temper as recommended by manufacturer for application and in compliance with manufacturers design requirements.
 1. Aluminum Material: Tension-leveled, fluoropolymer PVDF painted finish, 3003-H14 manganese alloy.
 2. Thickness: 0.080 inch.
 3. Weight: Less than 2 lbs per sf.
 4. Finish: Two-Coat Fluoropolymer.
 5. Color: To be selected by Architect from manufacturer's full range of selections.
- C. Panel Depth: 1-1/4-inch, nominal.
- D. Panel Size: As indicated on Drawings.
- E. Panel Joints: As indicated on Drawings.
- F. Attachment Assembly: Rainscreen-principle system.

2.3 MISCELLANEOUS MATERIALS

- A. Miscellaneous Metal Subframing and Furring: ASTM C645, cold-formed, metallic-coated steel sheet, ASTM A653 G90 coating designation or ASTM A792 Class AZ50 aluminum-zinc-alloy coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.
- B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.
- C. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, bases, drips, sills, jambs, corners, endwalls, framed openings, rakes, fasciae, parapet caps, soffits, reveals, and fillers. Finish flashing and trim with same finish system as adjacent metal panels.
- D. Panel Fasteners: Self-tapping screws designed to withstand design loads. Provide exposed fasteners with heads matching color of metal panels by means of plastic caps or factory-applied coating. Provide EPDM or PVC sealing washers for exposed fasteners.
- E. Panel Sealants: ASTM C920; elastomeric polyurethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as

recommended in writing by metal panel manufacturer. Provide sealant types that are compatible with panel materials, are nonstaining, and do not damage panel finish.

2.4 FABRICATION

- A. Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
- B. Fabricate metal panel joints with factory-installed captive gaskets or separator strips that provide a weathertight seal and prevent metal-to-metal contact, and that minimize noise from movements.
- C. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.
 - 1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
 - 2. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
 - 3. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
 - 4. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
 - 5. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
 - 6. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.
 - a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal wall panel manufacturer for application but not less than thickness of metal being secured.

2.5 FINISHES

- A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- C. Aluminum Panels and Accessories:
 - 1. Two-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

OR

2. FEVE Fluoropolymer: AAMA 2605. Two-coat fluoropolymer finish containing 100 percent fluorinated ethylene vinyl ether resin in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal panel supports, and other conditions affecting performance of the Work.
 1. Examine wall framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances required by metal wall panel manufacturer.
- B. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C754 and metal panel manufacturer's written recommendations.

3.3 INSTALLATION

- A. General: Install metal panels according to manufacturer's written instructions in orientation, sizes, and locations indicated. Install panels perpendicular to supports unless otherwise indicated. Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.
 1. Shim or otherwise plumb substrates receiving metal panels.
 2. Flash and seal metal panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal panels are installed.
 3. Install screw fasteners in predrilled holes.
 4. Locate and space fastenings in uniform vertical and horizontal alignment.
 5. Install flashing and trim as metal panel work proceeds.
 6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
 7. Align bottoms of metal panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
 8. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.

- B. Fasteners:
 - 1. Aluminum Panels: Use aluminum or stainless steel fasteners for surfaces exposed to the exterior; use aluminum or galvanized-steel fasteners for surfaces exposed to the interior.
- C. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal panel manufacturer.
- D. Attachment Assembly, General: Install attachment assembly required to support metal plate wall panels and to provide a complete weathertight wall system, including subgirts, perimeter extrusions, tracks, drainage channels, panel clips, and anchor channels.
 - 1. Include attachment to supports, panel-to-panel joinery, panel-to-dissimilar-material joinery, and panel-system joint seals.
- E. Installation: Attach metal plate wall panels to supports at locations, spacings, and with fasteners recommended by manufacturer to achieve performance requirements specified.
 - 1. Rainscreen Systems: Do not apply sealants to joints unless otherwise indicated.
- F. Clip Installation: Attach panel clips to supports at locations, spacings, and with fasteners recommended by manufacturer. Attach flanges of metal plate wall panels to panel clips with fasteners or by welding, as recommended by manufacturer.
 - 1. Seal horizontal and vertical joints between adjacent metal plate wall panels with sealant backing and sealant. Install sealant backing and sealant according to manufacturer's requirements.
 - 2. Seal horizontal and vertical joints between adjacent metal plate wall panels with manufacturer's standard gaskets.
- G. Subgirt Installation: Install support assembly at locations, spacings, and with fasteners recommended by manufacturer. Use manufacturer's standard subgirts that provide support and complete secondary drainage assembly, draining to the exterior at horizontal joints. Attach metal plate wall panels by interlocking perimeter extrusions attached to panels with subgirts and splines. Fully engage integral subgirt gaskets and leave horizontal and vertical joints with open reveal. Terminate edge of panels flush with perimeter extrusions.
 - 1. Install metal plate wall panels to allow individual panels to be installed and removed without disturbing adjacent panels.
 - 2. Do not apply sealants to joints unless otherwise indicated.
- H. Rainscreen-Principle Installation: Install using manufacturer's standard assembly with vertical channel that provides support and secondary drainage assembly, draining at base of wall. Notch vertical channel to receive support pins. Install vertical channels supported by channel brackets or adjuster angles and at locations, spacings, and with fasteners recommended by manufacturer. Attach metal plate wall panels by inserting horizontal support pins into notches in vertical channels and into flanges of panels. Leave horizontal and vertical joints with open reveal.
 - 1. Install metal plate wall panels to allow individual panels to be installed and removed without disturbing adjacent panels.
 - 2. Do not apply sealants to joints unless otherwise indicated.
- I. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete metal panel system including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by metal panel manufacturer; or, if not indicated, provide types recommended in writing by metal panel manufacturer.
- J. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that are permanently watertight.
 1. Install exposed flashing and trim that is without buckling and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof performance.
 2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

3.4 ERECTION TOLERANCES

- A. Installation Tolerances: Shim and align metal plate wall panel units within installed tolerance of 1/4 inch in 20 feet, non-accumulative, on level, plumb, and location lines as indicated, and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing agency to perform field tests and inspections.
- B. Water-Spray Test: After installation, test area of assembly as directed by Architect for water penetration according to AAMA 501.2.
- C. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect completed metal wall panel installation, including accessories.
- D. Remove and replace metal wall panels where tests and inspections indicate that they do not comply with specified requirements.
- E. Additional tests and inspections, at Contractor's expense, are performed to determine compliance of replaced or additional work with specified requirements.
- F. Prepare test and inspection reports.

3.6 CLEANING AND PROTECTION

- A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.

- B. After metal panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.
- C. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 074213.16

SECTION 099600 - HIGH-PERFORMANCE COATINGS

PART 1 - GENERAL

1.1 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
 - 1. Indicate VOC content.
- B. Samples for Verification: For each type of coating system and each color and gloss of topcoat indicated.
 - 1. Submit Samples on rigid backing, 8 inches square.
 - 2. Apply coats on Samples in steps to show each coat required for system.
 - 3. Label each coat of each Sample.
 - 4. Label each Sample for location and application area.
- C. Product List: Cross-reference to coating system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations.

1.2 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. Coatings: 5 percent, but not less than 1 gal. of each material and color applied.

1.3 QUALITY ASSURANCE

- A. Mockups: Apply mockups of each coating system indicated to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Architect will select one surface to represent surfaces and conditions for application of each coating system.
 - 2. Final approval of color selections will be based on mockups.
 - a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.
 - 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. 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.

1.5 FIELD CONDITIONS

- A. Apply coatings only when temperature of surfaces to be coated and ambient 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.
- C. Do not apply exterior coatings in snow, rain, fog, or mist.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. **Manufacturers:** Subject to compliance with requirements, to include resin type, volume solids +/- 5%, dry film thickness +/- 5%, gloss/sheen levels, VOC, all performance attributes, and any other sustainability and/or disclosure documents to Basis of Design Sherwin-Williams Company (The) provide products by one of the following:
 - 1. PPG
 - 2. Kelly-Moore
 - 3. Tnemec
 - 4. Or by Substitution Request procedures. See Div. 01
- B. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include but are not limited to products listed in the Exterior High-Performance Coating Schedule or Interior High-Performance Coating Schedule for the coating category indicated.

2.2 HIGH-PERFORMANCE COATINGS, GENERAL

- A. Material Compatibility:
 - 1. Materials for use within each paint system shall be 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 paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.
 - 3. Products shall be of same manufacturer for each coat in a coating system.
- B. Colors: As selected by Architect from manufacturer's full range.

2.3 SOURCE QUALITY CONTROL

- A. Testing of Coating Materials: Owner reserves the right to invoke the following procedure:
1. Owner will engage the services of a qualified testing agency to sample coating materials. Contractor will be notified in advance and may be present when samples are taken. If coating materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
 2. Testing agency will perform tests for compliance with product requirements.
 3. Owner may direct Contractor to stop applying coatings if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying coating materials from Project site, pay for testing, and recoat surfaces coated with rejected materials. Contractor will be required to remove rejected materials from previously coated surfaces if, on recoating with complying materials, the two coatings are incompatible.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. All preparation and installation conditions and procedures **MUST** be compliant with manufacturer's written recommendations/requirements by product and systems submitted for approval by Project Architect
- B. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- 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.
1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. 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 if any.
- B. 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.
 2. Clean surfaces with pressurized water. Use pressure range of 1500 to 4000 psi at 6 to 12 inches.

- C. Steel Substrates: Remove rust, loose mill scale, and shop primer if any. Clean using methods recommended in writing by paint manufacturer but not less than the following:
 - 1. SSPC-SP 7/NACE No. 4.
 - 2. SSPC-SP 11.
 - 3. SSPC-SP 6/NACE No. 3.
 - 4. SSPC-SP 10/NACE No. 2.
 - 5. SSPC-SP 5/NACE No. 1.
 - 6. SSPC-SP 2-3
- D. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
- E. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied coatings.

3.3 APPLICATION

- A. Apply high-performance coatings according to manufacturer's written instructions.
 - 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 backsides 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 FIELD QUALITY CONTROL

- A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test coatings for dry film thickness.
 - 1. Contractor shall touch up and restore coated surfaces damaged by testing.
 - 2. If test results show that dry film thickness of applied coating does not comply with coating manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with coating manufacturer's written recommendations.

3.5 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 to work of other trades 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.

3.6 EXTERIOR HIGH-PERFORMANCE COATING SCHEDULE

A. Steel Substrates:

1. Epoxy/Polyurethane System

- a. Prime Coat: Primer, epoxy, high build, semi-gloss
 - 1) S-W Macropoxy 646 Fast Cure Epoxy B58W00610/B58V00600
- b. Intermediate Coat: Epoxy, high build, semi-gloss
 - 1) S-W Macropoxy 646 Fast Cure Epoxy B58W00610/B58V00600
- c. Topcoat: Epoxy, gloss, or semi-gloss. See finish schedule for color and sheen
 - 1) S-W Acrolon 218 HS Polyurethane, B65W611/B65V600

B. Galvanized-Metal Substrates:

1. Epoxy/Polyurethane System

- a. Prime Coat: Primer, epoxy, high build, semi-gloss
 - 1) S-W Macropoxy 646 Fast Cure Epoxy B58W00610/B58V00600
- b. Intermediate Coat: Epoxy, high build, semi-gloss
 - 1) S-W Macropoxy 646 Fast Cure Epoxy B58W00610/B58V00600
- c. Topcoat: Epoxy, gloss, or semi-gloss. See finish schedule for color and sheen
 - 1) S-W Acrolon 218 HS Polyurethane, B65W611/B65V600

END OF SECTION 099600

SECTION 107500 - FLAGPOLES

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 mandrel-mounted flagpoles made from aluminum.
- B. Owner-Furnished Material: Flags.
- C. Related Requirements:
 - 1. Division 26 Section "Lightning Protection for Structures" for connecting roof-mounted metal flagpoles to lightning protection system.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include construction details, material descriptions, dimensions of individual components and profiles, operating characteristics, fittings, accessories, and finishes for flagpoles.
- B. Shop Drawings: For flagpoles, including plans, elevations, details, and attachments to other work. Show general arrangement, jointing, fittings, accessories, grounding, anchoring, and support. Include details of roof-mounted connections and mountings.
- C. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.
- D. Delegated-Design Submittal: For flagpoles. Include loads, point reactions, and locations for attachment of flagpoles to building's structure.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For flagpoles to include in operation and maintenance manuals.

1.5 COORDINATION

- A. Coordinate installation of anchorages for flagpoles. Furnish setting drawings, templates, and directions for installing anchorages that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Spiral wrap flagpoles with heavy paper and enclose in a hard fiber tube or other protective container.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain flagpoles as complete units, including fittings, accessories, bases, and anchorage devices, from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Division 01 Section "Quality Requirements," to design flagpole assemblies.
- B. Seismic Performance: Flagpole assemblies shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
- C. Structural Performance: Flagpole assemblies, including anchorages and supports, shall withstand design loads indicated within limits and under conditions indicated.
 - 1. Wind Loads: Determine according to NAAMM FP 1001. Basic wind speed for Project location is indicated on Drawings.
 - 2. Base flagpole design on nylon or cotton flags of maximum standard size suitable for use with flagpole or flag size indicated, whichever is more stringent.

2.3 ALUMINUM FLAGPOLES

- A. Aluminum Flagpoles: Entasis-tapered flagpoles fabricated from seamless extruded tubing complying with ASTM B241, Alloy 6063, with a minimum wall thickness of 3/16 inch.
 - 1. Manufacturers: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. American Flagpole.
 - b. Baartol Company.
 - c. Concord American Flagpole.
 - d. Eder Flag Manufacturing Company, Inc.
 - e. Pole-Tech Co., Inc.
 - f. US Flag & Flagpole Supply, LLC.
- B. Exposed Height: As indicated on Drawings.
- C. Construct flagpoles in one piece if possible. If more than one piece is necessary, comply with the following:
 - 1. Fabricate shop and field joints without using fasteners, screw collars, or lead calking.
 - 2. Provide flush hairline joints using self-aligning, snug-fitting, internal sleeves.
- D. Mandrel Mounting Base: Made from aluminum with same finish and color as flagpoles for anchor-bolt mounting; furnish with anchor bolts.

1. Furnish connector to building's lightning protection system conductor.

2.4 FITTINGS

- A. Finial Ball: Flush-seam ball, sized as indicated or, if not indicated, to match flagpole-butt diameter.
 1. 0.063-inch spun aluminum, finished to match flagpole.
- B. Internal Halyard, Winch System: Manually operated winch with control stop device and removable handle, stainless-steel cable halyard, and concealed revolving truck assembly with plastic-coated counterweight and sling. Furnish flush access door secured with cylinder lock. Finish truck assembly to match flagpole.
 1. Halyard Flag Snaps: Chromium-plated bronze swivel snap hooks with neoprene or vinyl covers. Furnish two per halyard.

2.5 MISCELLANEOUS MATERIALS

- A. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107.

2.6 ALUMINUM FINISHES

- A. Clear Anodic Finish: AAMA 611, AA-M12C22A41.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 FLAGPOLE INSTALLATION

- A. General: Install flagpoles where shown and according to Shop Drawings and manufacturer's written instructions.
- B. Baseplate: Install baseplate on washers placed over leveling nuts on bolts, and adjust until flagpole is plumb. After flagpole is plumb, tighten retaining nuts and fill space under baseplate solidly with nonshrink, nonmetallic grout. Finish exposed grout surfaces smooth and slope 45 degrees away from edges of baseplate.
- C. Mounting Brackets and Bases: Anchor brackets and bases securely to structural support with fasteners as indicated on Shop Drawings.

END OF SECTION 107500

SECTION 260010 – GENERAL ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. The requirements listed in this section are supplemental to the Division 01 General Requirements.
- B. It shall be the responsibility of the Electrical Contractor to examine and refer to all Architectural, Civil, Structural, and Scoreboard drawings and specifications for construction conditions which may affect the scope of Electrical work. Inspect the building site and existing facilities for verification of present conditions. Make proper provisions for these conditions in performance of the work and cost thereof.
- C. Electrical, Communications, Electronic Safety and Security work for this project shall include all items, articles, materials and the associated labor mentioned, schedules or shown in these specifications and in the accompanying drawings.
- D. Furnish and install all equipment, materials and any required incidental items required by good practice to complete the systems described herein.

1.2 DEFINITIONS - Throughout contract documents these words and phrases are used:

- A. Contract documents - All drawings, specifications, addenda and change orders that document work to be done.
- B. Demolition – Carefully disconnect and remove items. All reasonable caution shall be taken to avoid damaging removed equipment and to retain its operability.
- C. Remove back to source - Remove all conduit and wire back to panelboard or last live device.
- D. Equivalent or equal - Product of like type and function that complies with all applicable provisions of drawings and specifications and which has been approved as substitute for specified item.
- E. Furnish - Purchase material as shown and specified, and place material to approved location on site or elsewhere as noted or agreed upon.
- F. Install - Set in place and connect, ready for use and in complete and properly operating finished condition.
- G. Provide - Furnish and install with all products, labor, sub-contracts, and appurtenances required for a complete and properly operating, finished condition.
- H. Rough-in - Provide conduit raceway system with junction boxes, fittings, straps, BUSHINGS, etc., for future installation of wiring, devices, disconnects and breakers. Provision shall be made in panelboard (hardware, etc.) for future installation of breakers.
- I. Serviceable - Arranged so that component or product in question may be properly removed and replaced without disassembly, destruction or damage to surrounding installation.

1.3 CODES, STANDARDS AND REGULATIONS

- A. Codes - Perform all work in strict accordance with all applicable national, state and local codes; including, but not limited to latest legally enacted editions of following codes:
1. NFPA 70, National Electric Code – NEC
 2. NFPA 72, National Fire Alarm Code
 3. ANSI-C2, National Electrical Safety Code – NESC
 4. International Building Code – IBC
 5. International Fire Code – IFC
 6. International Energy Conservation Code – IECC
- B. Standards - Reference to standards infers that installation, equipment and material shall be within limits for which it was designed, tested and approved, in conformance with current publications and standards of following organizations:
1. American National Standards Institute – ANSI
 2. American Society for Testing and Materials – ASTM
 3. American Society of Heating Refrigerating and Air Conditioning Engineers – ASHRAE (Standard 90-75)
 4. Institute of Electrical and Electronics Engineers – IEEE
 5. Insulated Cable Engineers Association – ICEA
 6. National Electrical Contractors Association – NECA
 7. National Electrical Manufacturers' Association – NEMA
 8. National Fire Protection Association – NFPA
 9. Occupational Safety and Health Administration – OSHA
 10. Underwriters' Laboratories, Inc. – UL
 11. Rules and Regulations of the State/Local Fire Marshal
 12. Standards and Requirement of the Serving Utilities
 13. State and Local Ordinances
- C. Regulations - Design has been performed in accordance with applicable regulations and guidelines noted below. Contractor shall carefully apply these regulations and bring any discrepancies to immediate attention of Architect/Engineer.
1. Americans with Disabilities Act – ADA
 2. Architectural Barriers Act – ABA

1.4 FEES AND PERMITS

- A. Electrical Contractor shall pay for all permits or fees in connection with electrical work. Fees shall include any or all user fees, government fees, system development fees, connection fees or other fees that are required to be paid before systems can be connected or used.
- B. Schedule all required electrical inspections with local electrical inspector. Notify engineer of all items of discrepancy noted by electrical inspector if those items affect cost or function of system, or if they conflict with electrical drawings and specifications.
- C. Deliver all inspection certificates to Architect/Engineer prior to final acceptance of work.

1.5 INTENT OF SPECIFICATIONS AND DRAWINGS

- A. Plans and specifications are intended to result in complete electrical installation in full compliance with all applicable codes, standards and ordinances.
- B. Plans and specifications are to supplement each other and any details contained in one shall be included as if contained in both.
- C. Electrical drawings shall serve as working drawings, but Architectural drawings shall take precedence if any dimensional discrepancies exist.
- D. Drawings are partly diagrammatic and do not show routing of conduits, exact location of products, or installation features in exact detail. Locations of devices, fixtures and equipment are approximate unless dimensioned.
- E. Riser diagrams and control schematics are not to scale and do not show physical arrangement of equipment. Do not use riser diagrams or schematics to obtain lineal conduit and cabling distances.
- F. Items are shown on drawings in locations to minimize interference with other equipment, structural members, etc. Exact finish locations are not indicated, however, and all work shall be done to avoid interference, preserve headroom and keep openings and passageways clear.
- G. In event that discrepancies of any kind exist or required items/details have been omitted, Contractor shall notify Architect/Engineer in writing of such discrepancy or omission at least ten days prior to bid date. Failure to do so shall be construed as willingness of Contractor to supply all necessary materials and labor required for proper completion of work.

1.6 CONTRACTOR'S RESPONSIBILITY - Contractor shall be responsible for installation of complete and functional piece of work in accordance with true intent of contract documents. Provide all incidental items required for complete installation and satisfactory operation of all equipment, whether or not specifically noted in contract documents.

A. QUALIFICATIONS

- 1. Contractor shall employ on this project, capable, experienced and reliable foreman and such skilled workmen as may be required for various classes of work to be performed.
- 2. Where special skills and certification are required, Contractor shall ensure that work is performed by individuals with required experience, skill and certification.
- 3. If, in Engineer's opinion, Contractor's employees do not possess necessary qualifications to perform specialty work, Contractor will be required to obtain services of workmen who are approved by manufacturer and certified by applicable agency or group. These workmen, if required, shall be provided at no additional expense.
- 4. Refer to other specification sections for additional required contractor qualifications and certification.

- B. LICENSING AND CERTIFICATION - All Division 26 work shall be accomplished by Electricians, licensed by state in which work is being done, certified as required, and skilled in their craft. Electrician may elect to hire subcontractors for portions of work (such as systems described in Divisions 27 and 28) who are not licensed electricians, but have required certificates and are licensed in their discipline by state in which work is being done.

C. COORDINATION

1. Contractor shall consult all contract documents, shop drawings of other trades, and actual building dimensions to predetermine that his work and equipment will fit as planned. Do not scale drawings for fabrication. No extra payment will be issued for materials or items which do not fit because of Contractor's failure to verify as-built building dimensions.
2. Contractor shall check location of fixtures, outlets, equipment, conduit, etc., to determine they clear all openings, structural members, piping, ducts and miscellaneous equipment having fixed locations.
3. Changes in location of electrical work, necessary due to obstacles or installation of other trades shown on contract documents, shall be made by Electrical Contractor at no extra cost.
4. Contractor shall coordinate with Plumbing and Mechanical Contractors to avoid installation of piping and ductwork above or below panelboards in violation of National Electrical Code.
5. Lay out all work in advance and avoid conflict with other work in progress. Physical dimensions shall be determined from architectural and structural plans. Verify locations for junction boxes, disconnect switches, stub-ups, etc., for connection to equipment furnished by others, or in other Divisions of this work.
6. Contractor shall coordinate and plan work to proceed with work of other trades.
7. Contractor shall inform General Contractor of all required openings in building structure for installation of electrical equipment.
8. Contractor shall check dimensions of all electrical equipment installed, provided by himself or by others, so correct clearances and connections can be made.
9. Consulting all contract documents and shop drawings of other trades, contractor shall determine where electrical junction/pull boxes and equipment can be installed to maintain proper accessibility. Where accessibility cannot be maintained by judicious placement of boxes, Electrical Contractor shall coordinate with General Contractor to provide, fabricate, install, adjust, paint, etc. access doors through non-accessible floor, wall, and ceiling finishes to allow access to all electrical junction and pull boxes, electrical devices, electrical equipment, etc. at all required locations whether shown or not shown on plans. Electrical Contractor is responsible for determining size and location of the access doors. Report any conflicts to Architect/Engineer.

1.7 REVIEW

- A. All work and material is subject to review at any time by the Architect/Engineer or his representative. If the Architect/Engineer or his representative finds material that does not conform to these specifications or that is not properly installed or finished, correct the deficiencies in a manner satisfactory to the Architect/Engineer at the Contractor's expense.

1.8 TEMPORARY FACILITIES

A. ELECTRICAL UTILITIES

1. The Electrical Contractor shall provide temporary electrical power to the construction site as directed by the General Contractor. No connections to the owner's system shall be allowed without owner's written approval. Provide a separate utility service as required.
2. The Electrical Contractor shall provide temporary electrical power to job trailers as directed by the General Contractor.
3. The Electrical Contractor shall provide temporary communications to job trailers as directed by the General Contractor.
4. All Costs associated with temporary power, communications and utility cost shall be paid by to the General Contractor.

5. The Electrical Contractor shall provide temporary construction lighting as directed by the General Contractor to provide a safe working environment.
6. All temporary services are to be removed in their entirety prior to occupancy as directed by the General Contractor.

B. OFFICES

1. The Electrical Contractor must have the permission of the Owner and General Contractor or Construction Manager to install a temporary office/job trailer on the project site.
2. Contractor shall completely remove his temporary installations when no longer needed and the premises shall be completely clean, disinfected, patched, and refinished to match adjacent areas.

C. LADDERS AND SCAFFOLDS

1. The Electrical and Low-voltage Contractors shall provide their own ladders, scaffolds, etc. of substantial construction for access to their work in various portions of the building as may be required. When no longer needed, they shall be removed by the Contractor.

D. PROTECTION DEVICES

1. The Electrical and Low-voltage Contractors shall provide and maintain their own necessary barricades, fences, signal lights, etc., required by all governing authorities or shown on the drawings. When no longer needed, they shall be removed by the Contractor.

E. TEMPORARY FIRE PROTECTION

1. The Electrical and Low-voltage Contractors shall provide all necessary first aid hand fire extinguishers for Class A, B, C and special hazards as may exist in his own work area only in accordance with good and safe practice and as required by jurisdictional safety authority.

1.9 RECORD DOCUMENTS (AS-BUILT DRAWINGS)

- A. See requirements regarding record documents in General Division and Division 1.
- B. At beginning of work, Contractor shall set aside one complete set of drawings which shall be maintained as complete "As-Built" set. Drawings shall be updated daily in neat and legible manner and shall not be used for any other purpose. Drawings, specification, addenda, change orders, etc. shall be maintained at job site and available for review at any time.
- C. Show dimensioned location and routing of all electrical work that will become permanently concealed, cast in concrete or buried underground.
- D. Show complete routing and sizing of any significant revisions to systems shown.
- E. Show provisions for future connection, referenced to building lines or approved bench marks.
- F. Provide wiring diagrams for all individual communications systems as installed. Identify all components and show all wire and terminal numbers and connections.
- G. At completion of project, deliver drawings to Engineer for review.

1.10 WARRANTY

- A. The Contractor shall guarantee that all materials and labor installed are new and of first quality and that any material or labor found defective shall be replaced without cost to the Owner within one (1) year after substantial completion of the Contract or one (1) full season of heating and cooling operation, whichever is the greater. The guarantee shall list the date of the beginning of the one (1) year period, which shall be the date that the Substantial Completion Certificate is issued.
- B. Any damage to the building, caused by defective work or material of the Contractor within the above-mentioned period, shall be satisfactorily repaired without cost to the Owner.
- C. The guarantee does not include maintenance of equipment. The Owner shall accept full responsibility for proper operation and maintenance of equipment immediately upon substantial completion and occupancy of the building.
- D. Final acceptance by the Owner will not occur until all operating instructions are mounted in Equipment Rooms and Operating Personnel thoroughly indoctrinated in the operation of all electrical equipment by the Contractor.
- E. No equipment installed as part of this project shall be used for temporary heat during construction.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

- A. Manufacturer's trade names and catalog numbers listed are intended to indicate the quality of equipment or materials desired. Manufacturers not listed in the specification will be considered substitutions and must have prior approval.
- B. See Division 01 for Substitutions Procedures. Requests for substitution are to be submitted sufficiently ahead of the deadline, to give ample time for examination. Prior approval request for substitution must indicate the specific item or items to be furnished in lieu of those scheduled, together with complete technical and comparative data on scheduled items and items proposed for substitution.
- C. If the engineer approves any proposed substitution, the approved product will be listed in an addendum. Bidders shall not rely on approval made in any other manner.
- D. Electrical equipment may be installed with manufacturer's standard finish and color except where specific color, finish or choice is indicated. If the manufacturer has no standard finish, equipment shall have a prime coat and two finish coats of gray enamel.
- E. High altitude operation: Capacity of all equipment is to be sized and manufactured to perform at the elevation of the project site. If not specifically indicated in the equipment schedule or in the specifications provide all required accessories and equipment for proper operation at elevation of the project site.
- F. This Contractor shall be responsible for materials and equipment installed under this contract. Contractor shall also be responsible for the protection of materials and equipment of others from damage as a result of his work.

- G. Manufactured material and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned as directed by manufacturer unless herein specified to the contrary.
- H. This Contractor shall make the required arrangement with General Contractor or Construction Manager for the introduction into the building of equipment too large to pass through finished openings.
- I. Store materials and equipment indoors at the job site or, if this is not possible, store on raised platforms and protect from the weather by means of waterproof covers. Coverings shall permit circulation of air around the materials to prevent condensation of moisture. Screen or cap openings in equipment to prevent the entry of vermin.

2.2 SUBSTITUTION OF MATERIALS - Where substituted equipment requires structural, architectural, mechanical, plumbing or electrical work that differs from basic design, cost of all changes, including re-design, shall be responsibility of contractor using substitution.

A. APPROVED MANUFACTURERS

- 1. In general, one particular manufacturer and part number or series is listed to describe equipment. Equivalent equipment of other manufacturers listed for that item may be substituted without prior approval. It shall be Contractor's responsibility to ensure that item used for bidding purposes is truly equivalent to that specified. If it is not equivalent, it will be rejected at shop drawing review and Contractor shall supply specified item at his own cost.
- 2. It is understood that manufacturers listed may not actually have equivalent product to that specified. If contractor/distributor has any questions regarding desired product characteristics and suitability of proposed substitution, he is encouraged to submit for prior approval. Also, any manufacturer not listed shall be submitted for prior approval.

B. PRIOR APPROVALS

- 1. Manufacturers not listed in specification or on schedule for a particular item are open for substitution prior to bid opening only.
- 2. Manufacturers desiring approval shall submit catalog cuts that define quality of product and ability to perform as specified. It is understood that no two manufactures use identical methods or make identical products. Any and all deviations from that specified shall be clearly noted.
- 3. Submittals shall arrive at Engineer at least ten (10) days prior to bid opening. All approvals will be listed in last addendum as being approved to bid. Items substituted, but not listed in contract documents, will not be considered if submitted on shop drawings.
- 4. Approval of substitute equipment is on basis of quality only. Materials supplier shall be responsible for his quotation reflecting proper selection of his particular equipment with regard to proper capacities, physical dimensions, requirements, intended function, finish, color, etc. Engineer will not give approval to specific model numbers or check capacities, dimensions, or requirements. Evaluation will be on basis of quality and equality to specified items.
- 5. Prior approval shall be obtained from engineer and no other entity (architect, owner, etc.) is authorized to give such approval.

C. SAMPLES

1. Where, in Engineer/Architect's opinion, product sample is required in order to determine appearance, quality, workmanship or operation, Contractor shall submit actual production samples of item in question.
2. Samples will be returned to Contractor. Approved samples may be used.
3. All costs incurred in providing and returning samples will be Contractor's responsibility.

2.3 PRODUCT AND SYSTEM SUBMITTALS

A. Submittals will be required for each piece of equipment, material or product as noted in the table below. All submittal shall be submitted, reviewed and all discrepancies addressed prior to ordering equipment or starting work. Any equipment ordered without having first completed the submittal process is done at the risk of the contractor. Any work performed prior to completing the submittal process is done at the risk of the contractor.

B. SUBMITTAL DEFINITIONS

1. Product Data: Provide manufacturers cut sheets that include general product information including but not limited to: Model Number, physical data, nominal capacities, rough-in requirements.
2. Performance Data: Provide detailed performance and capacities based on project specific requirements including but not limited to: voltage, phase, amperage, overcurrent protection, conductor size, conductor material, conduit size, life expectancy, efficiency.
3. Shop Drawings: Provide detailed drawings of the equipment showing overall dimensions, location of electrical connection, location of anchorage points, location of electrical and control panels, and all operating, service and maintenance clearances.
4. Delegated Design: Provide detailed drawings prepared and stamped by a registered Professional Engineer that detail pertinent design criteria, the materials and products to be installed and the required installation locations.
5. Wiring Diagram: Provide diagrams that identify and detail required field wiring.
6. Color Chart: Provide a physical color chart of material samples required for selection of equipment colors.

C. SUBMITTAL FORMATS

1. Include the following information with each submittal:
 - a. Project Name
 - b. Submittal Date
 - c. Name of Architect
 - d. Name of Engineer
 - e. Name of General Contractor or Construction Manager
 - f. Name of Sub-Contractor
 - g. Name of firm or entity that prepared the submittal
 - h. Unique Submittal Number
 - i. Type of Submittal
 - j. Specification Section
 - k. Name or Mark of equipment or material and detail or drawings reference.
2. All Submittal with the exception of color charts or material samples shall be electronically transmitted PDFs. All submittals over 8 Mb shall be setup on a share file site and access granted through email with folder's link for download.

D. SUBMITTAL REQUIREMENTS

1. Submittals shall be submitted as a complete specification section. The submittal must include all materials and equipment for that specification section. Submittals for individual materials of equipment will be rejected without review.
 2. Submittals shall be complete, clearly show item used, size, dimensions, capacity, rough in, etc., as required for complete check and installation. Manufacturer's literature showing more than one item shall be clearly marked as to which item is being furnished or it will be rejected and returned without review.
 3. Each submittal shall be thoroughly checked by the Contractor for compliance with the Contract Document requirements, accuracy of dimensions, relationship to the work of other trades, and conformance with sound, safe practices as to erection and installation. Each submittal shall then bear a stamp evidencing such checking and shall show corrections made, if any. Submittals requiring extensive corrections shall be revised before submission. Each submittal not stamped and signed by the General and Electrical Contractors evidencing such checking will be rejected and returned without review.
 4. On each submittal, clearly indicate deviations from requirements in the Contract Documents, including minor variations and limitations; include relevant additional information and revisions, other than those requested on previous submittals. Indicate by highlighting on each submittal or noting on attached separate sheet.
 5. Review of the shop drawings and literature by the engineer shall not relieve the contractor for responsibility for deviations for the drawings or specifications, nor shall it relieve the contractor from responsibility for errors in the shop drawings or literature. It is the responsibility of the contractor to provide materials and equipment which meet the specifications and job requirements.
- E. ENGINEER'S REVIEW - Submittal review is for general design and arrangement only and does not relieve Contractor from any requirements of contract documents. Submittals will not be checked for quantity, dimension, fit or proper technical design of manufactured equipment. Where product or system performance deviations have not been specifically noted in submittal by Contractor, Engineer's review will not relieve Contractor's responsibility to provide complete and satisfactory working installation of equal quality and performance to specified system. Ordering, manufacture, shipment or installation of equipment prior to receipt of Engineer's written review is strictly at Contractor's risk and all costs associated with shipping, changes, replacement or restocking shall be Contractor's responsibility.
- 2.4 SUB-CONTRACTORS - With shop drawing submittals, Contractor shall submit list of all sub-contractors to be used for the project.
- 2.5 OPERATION AND MAINTENANCE MANUALS
- A. Operation and Maintenance Manuals (O&M Manuals) shall contain:
1. Names and contact information for the Project Architect, Project Engineer.
 2. Names and contact information for the General Contractor or Construction Manager.
 3. Names and contact information for sub-contractors.
 4. Installation, maintenance and operating instructions for each piece of equipment.
 5. Parts lists
 6. Wiring Diagrams
 7. Equipment Start-up and inspection certificates
 8. Test and Balance Reports
 9. Commissioning Reports
 10. Copies of Equipment Warranties
 11. Copies of Submittals

12. Record Drawings.
 13. Training DVD's.
- B. Prior to substantial completion submit an electronic copy of the O&M manual in PDF format to the Architect, Engineer and Owner for Review and approval. The PDF shall be one file with an index and hyperlinks to each section. Individual bound PDFs without automated navigation will be rejected. All O&M data shall be grouped by the equipment type and ordered by the specification numbering.
- C. Prior to final payment a final electronic copy of the O&M manual on an archival quality DVD as well as two printed copies shall be furnished to the owner. Printed copies shall have commercial quality 8-1/2" x 11" 3-ring binders with tabbed dividers for each section.

PART 3 - EXECUTION

3.1 SITE EXAMINATION

- A. Prior to submitting bid, Contractor shall visit site of proposed work and familiarize himself with conditions affecting work. Allowance shall be made in bid for these conditions and no additional allowance shall be granted because of lack of knowledge of such conditions.
- B. Contractor shall verify all measurements at building site.

3.2 CUTTING AND PATCHING

- A. Obtain written permission of Architect/Engineer before cutting or piercing structural members.
- B. Sleeves through floors and walls shall be black iron pipe, flush with walls, ceilings or finished floors, sized to accommodate raceway. Grout all penetrations through concrete walls or floors. Holes through existing concrete and concrete block (CMU) shall be core drilled.

3.3 CLEAN-UP AND COMMISSIONING

- A. DURING CONSTRUCTION - Throughout construction, keep work area reasonably neat and orderly by periodic clean-ups.
- B. COMMISSIONING - As independent parts of construction are completed, they may be commissioned and utilized during construction. See various sections for restrictions.
- C. AT COMPLETION OF WORK
1. Clean equipment of dirt and debris, including interior of panels, outlet boxes, etc. Remove labels from and clean all fixture lenses.
 2. Remove materials, scraps, etc., relative to this work and leave premises in clean and orderly condition. This includes all tunnels, attics, ceiling and crawl spaces.
 3. Remove all temporary facilities and restore to conditions present prior to work.

3.4 PROJECT COMPLETION AND DEMONSTRATION

A. TESTING

1. Prior to final test, all switches, panelboards, devices, and fixtures shall be in place.
2. At completion of work, or upon request from Architect/Engineer, place entire electrical installation, and/or any portion thereof, in operation to demonstrate satisfactory operation.
3. All electrical systems shall be free from short circuits and unintentional grounds.
4. Furnish one (1) copy of certified test results to Architect/Engineer prior to final inspection and include one (1) copy in each Brochure of Equipment.

B. ADJUSTMENTS

1. Make all changes necessary to balance connected electrical loads on complete system. Arrange for balanced conditions of circuits under connected load demands, as contemplated by normal working conditions. Final load and balance test shall be demonstrated in presence of Architect/Engineer.
2. Immediately correct all deficiencies which are evidenced during tests and repeat tests until system is approved. Do not cover or conceal electrical installations until satisfactory tests are made and approved.

C. FINAL WALK-THRU

1. Conduct operating tests during final inspection. Demonstrate installation to operate satisfactorily in accordance with requirements of Contract Documents. Should any portion of installation fail to meet requirements of Contract Documents, repair or replace items failing to meet requirements until items can be demonstrated to comply.
2. Have instruments available for measuring light intensities, voltage and current values and for demonstration of continuity, grounds, or open circuit conditions.
3. Furnish personnel to assist in taking measurements and making tests. In event that systems are not complete and fully operational at time of final inspection, all costs of any subsequent inspections shall be borne by Contractor at no additional cost to Owner.

3.5 OWNER ORIENTATION AND TRAINING

A. GENERAL

1. 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 commissioning have been resolved, and before final acceptance.
2. Provide second set of training sessions for automatic control systems about 6-9 months after the first sessions.
3. All Training shall be videotaped and reproduced on DVD's and given to the owner. Provide a copy for each O&M manual produced.
4. See Individual specification sections for additional training requirements.

B. ATTENDANCE

1. Training is to be provided by contractor's representatives that are familiar with the system's operation and maintenance requirements. Individual training sessions (modules) are to be provided for each type or group of systems, separated roughly by trade group that will be performing maintenance on the system.

C. SCHEDULE

1. 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 on different days. Length of training sessions will be determined by scope of training indicated below, and as coordinated with Owner after draft copy of training documents have been reviewed.

D. TRAINING DOCUMENTATION

1. Contractor to submit draft copy of agenda and training documents to Owner for review at least two weeks prior to training date.
2. Provide a copy of the following items for each person that will be attending the training sessions. Coordinate required number with the Owner.
 - a. Training agenda.
 - b. Summary of new systems and existing systems affected by this project.
 - c. Summary of work performed under this project.
 - d. Control system drawings and sequences of operation.
 - e. List of important maintenance and trouble-shooting operations for all systems.
3. Provide minimum of 2 copies of following items:
 - a. Contract documents including all drawings, specifications, addendums, and change orders.

E. TRAINING SESSIONS

1. Assemble at location to be determined by the Owner.
2. Distribute training documentation as indicated above.
3. 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.
4. Visit site and review locations, and perform detailed review of operation and maintenance requirements for current systems.
5. All training session shall be video recorded and distributed to the owner upon completion in DVD format, or owner desired format. Include all training videos in the O&M manual.

END OF SECTION 260010

SECTION 260505 - SELECTIVE DEMOLITION OF ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. This section describes general requirements and methods of execution relating to selective demolition of electrical systems.
- B. Not all removal and revision work required as part of the demolition work is shown on the plans. The plans are intended to indicate areas where demolition will occur and to establish the intent of the demolition work. It is the Contractor's responsibility to remove all existing electrical raceways, wires, devices and equipment that fall within the area affected by demolition of the structure.
- C. The Contractor shall thoroughly familiarize himself with work and local conditions under which the work is to be performed. Using original design drawings and walk-through inspections, a concerted effort was made to place pertinent information on contract drawings. However, due to nature of demo/remodel work, the Contractor must bear in mind that unforeseen conditions may exist, and shall thoroughly inspect work area prior to his bid. The Contractor shall include in his bid any incidental items which may be required to provide complete demolition and rework associated systems in adjacent areas where no demolition is occurring.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

- A. Provide materials in accordance with applicable sections in these specifications where:
 - 1. Additional conduit, fittings, conductors, etc., are required for re-connection of circuits that extend beyond the demolition area.
 - 2. Devices or equipment need to be temporarily or permanently relocated.
 - 3. Portions of the remaining structure need to be patched or resurfaced.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify field measurements and circuiting arrangements as shown on Drawings.
- B. Verify that raceways, wiring and equipment being demo'ed only serve facilities in the designated demolition area.
- C. Examine existing light fixtures being removed to verify if ballasts contain PCB's.

3.2 PREPARATION

- A. Provide temporary wiring and connections to maintain existing systems in service during construction. When work must be performed on energized equipment or circuits, use personnel experienced in such operations and follow the safe working practice requirements of NFPA 70E.

- B. PRE-DEMOLITION MEETING - Participate in a pre-demolition meeting at the project site with Owner and all affected stakeholders.
 - 1. Inspect and discuss the condition of construction to be selectively demolished.
 - 2. Review all asbestos reports and plan electrical demo work to comply with report findings.
 - 3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
 - 4. Review and coordinate requirements of work performed by other trades.
 - 5. Review areas where existing construction is to remain and requires protection.
 - 6. Review procedures to be followed when critical systems are inadvertently interrupted. The Contractor shall be responsible for the coordination required with Owner prior to device/system removal to ensure systems that must remain operational are not compromised during the demolition process.

- C. SURVEY OF EXISTING CONDITIONS - Record existing conditions by use of preconstruction photographs or video.
 - 1. Inventory and record the condition of items to be removed and salvaged. Provide photographs or video of conditions that might be misconstrued as damage caused by salvage operations.
 - 2. Before selective demolition or removal of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.

- D. EXISTING ELECTRICAL SERVICE
 - 1. Make provisions to maintain existing power system in service until new system is complete and ready for use.
 - 2. Disable the power system only to make switchovers and connections.
 - 3. Obtain permission from the Owner and the Architect/Engineer at least [48] hours prior to partially or completely disabling the system.
 - 4. Minimize the duration of any outages.
 - 5. If required, make temporary connections to maintain service in areas adjacent to the demolition work area.

- E. EXISTING COMMUNICATION/DATA SYSTEMS
 - 1. Maintain the existing owner systems in service at all times.
 - 2. Disable systems only to make switchovers and connections.
 - 3. Obtain permission from the Owner and the Architect/Engineer at least [48] hours prior to partially or completely disabling any systems.
 - 4. If required, make temporary connections to maintain service in areas adjacent to the demolition work area.

- F. EXISTING FIRE ALARM SYSTEM
 - 1. Maintain existing system in service at all times.
 - 2. Disable system only to make switchovers and connections.

3. Obtain permission from the Owner and the Architect/Engineer at least [48] hours prior to partially or completely disabling the fire alarm system.
4. Minimize the duration of any outages and maintain a fire watch throughout the outage duration.
5. If required, make temporary connections to maintain service in areas adjacent to the demolition work area.

3.3 COORDINATION

- A. The Contractor is responsible for providing and coordinating phased activities and construction methods that minimize disruption to facility operations. Ensure that any portion of systems or devices to remain continue to be complete and operational. Equipment and devices shall not be removed or reconfigured until coordinated with owner.
- B. The Contractor shall coordinate interfaces to existing systems that are being demolished in order to minimize disruption to the existing systems operations. Coordinate all utility service and system outages with the Owner's Representative, the Architect/Engineer and the local Utility Company as applicable.
- C. Demolition and remodel shall be done quickly so as to not hinder other trades.
- D. Refer to demolition drawings, new drawings and site drawings to coordinate demolition and remodel efforts. Notify Architect/Engineer of any discrepancies.

3.4 EXISTING SERVICES/SYSTEMS TO REMAIN - Maintain services/systems indicated to remain and protect them against damage.

- A. Comply with requirements for existing services/systems interruptions.
- B. When temporary bypass systems are installed, test and get approval from Engineer before proceeding with demolition of existing systems.
- C. For existing equipment cabinets with active components in them, provide an air tight dust seal around the cabinet and circulate cooling air with a portable air conditioning unit or other means to ensure equipment does not overheat.

3.5 DEMOLITION

- A. Revise electrical connections as required to remove all equipment and items listed herein or shown on plans. 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
- B. Remove all electrical devices from walls, floors and ceilings that are to be demolished or moved. This includes but is not limited to:
 1. Abandoned panelboards and distribution equipment along with the conduits and wires that constitute their feeders.
 2. Starters, disconnects and other devices and equipment serving utilization equipment that is being removed.
 3. Light fixtures including brackets, stems, hangers, and other accessories.
 4. Switches, outlets, horns, bells, intercom stations, clocks, etc.

- C. Remove abandoned outlets if conduit and wiring servicing them is abandoned and removed. Provide blank cover for any abandoned boxes which are noted on the plans as not removed.
- D. Remove conduit to point where it no longer interferes with construction and is concealed. For conduit buried in concrete or CMU walls, cut conduit off flush with floor and plug conduit.
- E. If certain conduits and boxes are abandoned but not scheduled for removal, they shall be shown on the "As Built Drawings".
- F. If the plans specifically call for conduits that are routed through the demolition area, and are to remain, provide supplemental support to meet the requirements in:
 - 1. Section 260529 "Hangers and Supports for Electrical Systems."
 - 2. Section 260533 "Raceways and Boxes for Electrical Systems."
 - 3. Section 260548.16 "Seismic Controls for Electrical Systems."
- G. Remove all conductors back to source (panelboard or last live device). Remove all abandoned communications and security systems cable from origin to destination (do not abandon in place UNO).
- H. Contractor shall give Owner option to keep demo'ed electrical items of his choice. Contractor is responsible for disposal of all remaining electrical items.
- I. Contractor shall be responsible for disposal of all removed lamps and ballasts. Ballasts may contain PCB's and lamps may contain Mercury. These shall be disposed of according to environmental regulations.
- J. Provide revised typed circuit directory in panelboards that have circuits removed.
- K. Repair adjacent construction and finishes damaged during demolition and extension work.
- L. Maintain access to existing electrical installations that remain active. Modify installation or provide access panel as appropriate.
- M. 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 any openings to remain.
- N. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
- O. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain fire watch and/or portable fire suppression devices during flame-cutting operations.
- P. Maintain adequate ventilation when using cutting torches.
- Q. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
- R. Dispose of demolished items and materials promptly.

3.6 RELOCATION OF EXISTING EQUIPMENT

- A. Equipment to be relocated shall be serviced, modified and repaired as necessary to place it in good working order and to satisfaction of Architect/Engineer.
- B. Pack or crate items after cleaning and repairing. Identify contents of containers.
- C. Protect items from damage during transport and storage.
- D. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make the item functional for use at its new location.
- E. Equipment shall be tested in the new location and proper function demonstrated.

3.7 DISPOSAL OF DEMOLISHED MATERIALS

- A. General: Except for items or materials indicated to be recycled, reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.
 - 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.
- B. Burning: Do not burn demolished materials.
- C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

3.8 LAMP DISPOSAL

- A. All lamps contain mercury and/or lead, as well as other heavy metals and compounds which are regulated by the EPA. As a result, regulations have been issued covering the handling and disposal of all lamps. Lamps which have been removed from service for disposal shall be handled as follows by the Contractor:
 - 1. The Contractor shall very carefully remove all lamps (fluorescent, incandescent, and HID) from light fixtures before removal of the fixture from its mounted position. This is to reduce the likelihood that the lamps will be broken.
 - 2. All fluorescent, neon, mercury vapor, high pressure sodium, and metal halide lamps shall be recycled in accordance with Administrative Rules of Montana ARM 17.53.1303 by either working with a certified recycler from this list: https://deq.mt.gov/Portals/112/Land/hazwaste/documents/HAZ_Lamp_Recycler_Lst.pdf, or by becoming a small quantity handler of universal waste in accordance with 40 CFR 273. In either case, the contractor shall be responsible for storing, labeling, shipping and training workers in accordance with 40 CFR 273. Include recycling receipts in O&M Manuals at the completion of the project.

3.9 CLEANING

- A. Clean adjacent structures and improvements of dust, dirt, and debris caused by demolition operations. Return adjacent areas to condition existing before demolition operations began.
- B. The contractor shall be required, on a daily basis, to dispose of any demolished material not required to be returned to the Owner. All materials shall be transported off of the Owner's property at the expense of the Contractor.
- C. At the end of each work day or shift, the Contractor shall be required to clean up the work area and remove all construction debris such that the site is clean and usable without hazard to workers.

END OF SECTION 260505

SECTION 260519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Copper building wire rated 600 V or less.
2. Connectors, splices, and terminations rated 600 V and less.

B. Related Requirements:

1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 COPPER BUILDING WIRE

A. Description: Flexible, insulated and uninsulated, drawn copper current-carrying conductor with an overall insulation layer or jacket, or both, rated 600 V or less.

B. 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:

1. Alcan Products Corporation; Alcan Cable Division.
2. Alpha Wire Company.
3. Belden Inc.
4. Cerro Wire LLC.
5. Encore Wire Corporation.
6. General Cable Technologies Corporation.
7. Okonite Company.
8. Service Wire Co.
9. Southwire Incorporated.
10. WESCO

C. Standards:

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
2. RoHS compliant.
3. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."

- D. Conductors: Copper, complying with ASTM B 3 for bare annealed copper and with ASTM B 8 for stranded conductors.
- E. Conductor Insulation:
 - 1. Type USE-2 and Type SE: Comply with UL 854.
 - 2. Type THHN and Type THWN-2: Comply with UL 83.
 - 3. Type THW-2: Comply with NEMA WC-70/ICEA S-95-658 and UL 83.
 - 4. Type XHHW-2: Comply with UL 44.

2.2 METAL-CLAD CABLE, TYPE MC

- A. Description: A factory assembly of one or more current-carrying insulated conductors in an overall metallic sheath.
- B. Not Approved for use unless specifically allowed in writing from Owner.
- C. 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:
 - 1. AFC Cable Systems.
 - 2. Alpha Wire Company.
 - 3. Belden Inc.
 - 4. Encore Wire Corporation.
 - 5. General Cable Technologies Corporation.
 - 6. Okonite Company.
 - 7. Service Wire Co.
 - 8. Southwire Incorporated.
 - 9. WESCO
- D. Standards:
 - 1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
 - 2. Comply with UL 1569.
- E. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."
- F. Conductors: Copper, complying with ASTM B 3 for bare annealed copper and with ASTM B 8 for stranded conductors.
- G. Ground Conductor: Insulated.
- H. Conductor Insulation:
 - 1. Type TFN/THHN/THWN-2: Comply with UL 83.
- I. Armor: Steel, interlocked.
- J. Jacket: PVC applied over armor for mechanical connection or wet/damp environments

2.3 CONNECTORS AND SPLICES

- A. Description: Factory-fabricated connectors, splices, and lugs of size, ampacity rating, material, type, and class for application and service indicated; listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
- B. 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:
 - 1. 3M Electrical Products
 - 2. AFC Cable Systems, Inc.
 - 3. Gardner Bender.
 - 4. Hubbell Power Systems, Inc.
 - 5. Ideal Industries, Inc.
 - 6. IIsco; a branch of Bardes Corporation.
 - 7. NSi Industries LLC.
 - 8. O-Z/Gedney; a brand of the EGS Electrical Group.
 - 9. Service Wire Co.
 - 10. TE Connectivity Ltd.
 - 11. Thomas and Betts Corp

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

- A. Feeders and Branch Circuits: Copper; solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

3.2 CONDUCTOR INSULATION AND WIRING METHODS

- A. Feeders: Type THHN/THWN-2, single conductors in raceway.
- B. Branch Circuits: Type THHN/THWN-2, single conductors in raceway.
- C. Cord Drops and Portable Appliance Connections: Type SO, hard service cord with stainless-steel, wire-mesh, strain relief device at terminations to suit application.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

- A. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.
- B. Complete raceway installation between conductor and cable termination points according to Section 260533 "Raceways and Boxes for Electrical Systems" prior to pulling conductors and cables.
- 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 Section 260529 "Hangers and Supports for Electrical Systems."
- G. **Provide a dedicated neutral conductor for each 120 V branch circuit.**

3.4 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-486B.
- B. Make splices, terminations, and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
- C. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches (150 mm) of slack.

3.5 IDENTIFICATION

- A. Identify and color-code conductors and cables according to Section 260553 "Identification for Electrical Systems."
- B. Identify each spare conductor at each end with identity number and location of other end of conductor, and identify as spare conductor.

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 Section 260544 "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.

END OF SECTION 260519

SECTION 260526 - GROUNDING AND BONDING 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. RATIONALE – Grounding provides the foundation to the entire electrical system. This system is designed to:
 - 1. Protect personnel.
 - 2. Minimize damage to equipment and property in the event of high fault current situations,
 - 3. Improve overall electrical system reliability, and
 - 4. Minimize the effects of transient overvoltages.
- B. Section includes grounding and bonding systems and equipment.

1.3 ACTION SUBMITTALS

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

1.4 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Plans showing dimensioned as-built locations of grounding features specified in "Field Quality Control" Article.
 - 1. Ground rods
- B. Qualification Data: For testing agency and testing agency's field supervisor.
- C. Field quality-control reports.
- D. Photographs of ground rod installation prior to burial.
- E. Photographs of Cadweld connections to rebar and building steel.
- F. Certified test results from ground resistance measurements.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with UL 467 for grounding and bonding materials and equipment.

2.2 CONDUCTORS

- A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.
- B. Equipment and wiring device grounding conductor shall be as follows:
 - 1. Bare copper or have green insulation of same type as circuit conductors (larger wires may be permanently marked with green).
 - 2. Properly sized in accordance with the NEC.
- C. Bare Copper Conductors:
 - 1. Solid Conductors: ASTM B 3.
 - 2. Stranded Conductors: ASTM B 8.
 - 3. Tinned Conductors: ASTM B 33.
 - 4. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch (6 mm) in diameter.
 - 5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
 - 6. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.
 - 7. Tinned Bonding Jumper: Tinned-copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.
- D. Grounding Bus: Predrilled rectangular bars of annealed copper, 1/4 by 4 inches (6.3 by 100 mm) in cross section, with 9/32-inch (7.14-mm) holes spaced 1-1/8 inches (28 mm) apart. Stand-off insulators for mounting shall comply with UL 891 for use in switchboards, 600 V and shall be Lexan or PVC, impulse tested at 5000 V.

2.3 CONNECTORS

- A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.
- B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy, pressure type with at least two bolts.
 - 1. Pipe Connectors: Clamp type, sized for pipe.
- C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

- D. Bus-Bar Connectors: Mechanical type, cast silicon bronze, solderless compression-type wire terminals, and long-barrel, two-bolt connection to ground bus bar.
- E. Beam Clamps: Mechanical type, terminal, ground wire access from four directions, with dual, tin-plated or silicon bronze bolts.
- F. Cable-to-Cable Connectors: Compression type, copper or copper alloy.
- G. Conduit Hubs: Mechanical type, terminal with threaded hub.
- H. Ground Rod Clamps: Mechanical type, copper or copper alloy, terminal with hex head bolt.
- I. Lay-in Lug Connector: Mechanical type, copper rated for direct burial terminal with set screw.
- J. Service Post Connectors: Mechanical type, bronze alloy terminal, in short- and long-stud lengths, capable of single and double conductor connections.
- K. Signal Reference Grid Clamp: Mechanical type, stamped-steel terminal with hex head screw.
- L. Straps: Solid copper, copper lugs. Rated for 600 A.
- M. Tower Ground Clamps: Mechanical type, copper or copper alloy, terminal one-piece clamp.
- N. U-Bolt Clamps: Mechanical type, copper or copper alloy, terminal listed for direct burial.

2.4 GROUNDING ELECTRODES

- A. Ground Rods: Copper-clad steel; 3/4 inch by 10 feet (19 mm by 3 m).

PART 3 - EXECUTION

3.1 APPLICATIONS

- A. Conductors: Install solid conductor for No. 10 AWG and smaller, and stranded conductors for No. 8 AWG and larger unless otherwise indicated.
- B. Grounding Bus: Install in electrical equipment rooms, in rooms housing service equipment, and elsewhere as indicated.
 - 1. Install bus horizontally, on insulated spacers 2 inches (50 mm) minimum from wall, 6 inches (150 mm) above finished floor unless otherwise indicated.
- C. Conductor Terminations and Connections:
 - 1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
 - 2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
 - 3. Connections to Ground Rods at Test Wells: Bolted connectors.
 - 4. Connections to Structural Steel: Welded connectors.
 - 5. Any threaded bolt connectors shall be torqued in accordance with manufacturer's guidelines.

3.2 GROUNDING AT THE SERVICE

- A. Equipment grounding conductors and grounding electrode conductors shall be connected to the ground bus. Install a main bonding jumper between the neutral and ground buses.

3.3 EQUIPMENT GROUNDING

- A. Install insulated equipment grounding conductors with all feeders and branch circuits. Do not rely on conduit for the grounding path.
- B. Multiple circuits sharing a raceway may share a single grounding conductor if all of the following requirements are met:
 - 1. All circuits originate in the same panel.
 - 2. No more than three single pole circuits may share a ground conductor.
 - 3. Size the ground conductor for the largest circuit.
- C. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:
 - 1. Feeders and branch circuits.
 - 2. Lighting circuits.
 - 3. Receptacle circuits.
 - 4. Single-phase motor and appliance branch circuits.
 - 5. Three-phase motor and appliance branch circuits.
 - 6. Flexible raceway runs.
 - 7. Armored and metal-clad cable runs.

3.4 INSTALLATION

- A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
- B. Ground Rods: Drive rods until tops are 2 inches (50 mm) below finished floor or final grade unless otherwise indicated.
 - 1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.
 - 2. For grounding electrode system, install at least 2 rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes, and connect to the service grounding electrode conductor.
- C. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.
 - 1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
 - 2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.
 - 3. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.

- D. Ufer Ground (Concrete-Encased Grounding Electrode): Fabricate according to NFPA 70, and as detailed on drawings. If drawing does not provide Ufer ground detail install the grounding electrode as defined below:
 - 1. Use a minimum of 20 feet (6 m) of bare copper conductor not smaller than No. 4 AWG.
 - 2. If concrete foundation is less than 20 feet (6 m) long, coil excess conductor within base of foundation.
 - 3. Bond grounding conductor to reinforcing steel in at least four locations and to anchor bolts. Extend grounding conductor below grade and connect to building's grounding grid or to grounding electrode external to concrete.
- E. Structural Steel: When available, bond structural steel to grounding electrode system, according to NFPA 70.

3.5 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Tests and Inspections:
 - 1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
 - 2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
 - 3. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, and at individual ground rods. Make tests at ground rods before any conductors are connected.
 - a. Measure ground resistance no fewer than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
 - b. Perform tests by fall-of-potential method according to IEEE 81.
 - 4. Prepare dimensioned Drawings locating each test well, ground rod and ground-rod assembly, and other grounding electrodes. Identify each by letter in alphabetical order, and key to the record of tests and observations. Include the number of rods driven and their depth at each location, and include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.
- C. Grounding system will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.
- E. Report measured ground resistances that exceed 25 ohms to ground.
- F. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.

END OF SECTION 260526

SECTION 260529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Steel slotted support systems.
2. Conduit and cable support devices.
3. Support for conductors in vertical conduit.
4. Structural steel for fabricated supports and restraints.
5. Mounting, anchoring, and attachment components, including powder-actuated fasteners, mechanical expansion anchors, concrete inserts, clamps, through bolts, toggle bolts, and hanger rods.
6. Fabricated metal equipment support assemblies.

B. Related Requirements:

1. Section 260548.16 "Seismic Controls for Electrical Systems" for products and installation requirements necessary for compliance with seismic criteria.

1.2 ACTION SUBMITTALS

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

1.3 INFORMATIONAL SUBMITTALS

- ##### A. Seismic Qualification Data: Certificates, for hangers and supports for electrical equipment and systems, accessories, and components, from manufacturer.

1.4 COORDINATION

- ##### A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified together with concrete Specifications.
- ##### B. Coordinate installation of roof curbs, equipment supports, and roof penetrations.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- ##### A. Seismic Performance: Hangers and supports shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1. The term "withstand" means "the supported equipment and systems will remain in place without separation of any parts when subjected to the seismic forces specified and the supported equipment and systems will be fully operational after the seismic event."

2.2 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

- A. Steel Slotted Support Systems: Preformed steel channels and angles with minimum 13/32-inch- (10-mm-) diameter holes at a maximum of 8 inches (200 mm) o.c. in at least one surface.
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. Allied Tube & Conduit; a part of Atkore International.
 - b. B-line, an Eaton business.
 - c. ERICO International Corporation.
 - d. Flex-Strut Inc.
 - e. Gripple Inc.
 - f. G-Strut.
 - g. Thomas & Betts Corporation; A Member of the ABB Group.
 - h. Unistrut; Part of Atkore International.
 2. Standard: Comply with MFMA-4 factory-fabricated components for field assembly.
 3. Material for Channel, Fittings, and Accessories: Galvanized steel.
 4. Channel Width: Selected for applicable load criteria.
 5. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
 6. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
 7. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
 8. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.
- C. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for nonarmored 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 made of malleable iron.
- D. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M steel plates, shapes, and bars; black and galvanized.
- E. 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.
 2. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel, for use in hardened portland cement concrete, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
 3. Concrete Inserts: Steel or malleable-iron, slotted support system units are similar to MSS Type 18 units and comply with MFMA-4 or MSS SP-58.
 4. Clamps for Attachment to Steel Structural Elements: MSS SP-58 units are 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.

2.3 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

- A. Description: Welded or bolted structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.

PART 3 - EXECUTION

3.1 APPLICATION

- A. Comply with the following standards for application and installation requirements of hangers and supports, except where requirements on Drawings or in this Section are stricter:
1. NECA 1.
 2. NECA 101
 3. NECA 102.
 4. NECA 105.
 5. NECA 111.
- B. Comply with requirements for firestopping materials and installation for penetrations through fire-rated walls, ceilings, and assemblies.
- C. Comply with requirements for raceways and boxes specified in Section 260533 "Raceways and Boxes for Electrical Systems."
- D. Maximum Support Spacing and Minimum Hanger Rod Size for Raceways: Space supports for EMT, IMC, and RMC as required by NFPA 70. Minimum rod size shall be 1/4 inch (6 mm) in diameter.
- E. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.
1. Secure raceways and cables to these supports with two-bolt conduit clamps.
- F. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch (38-mm) and smaller raceways serving branch circuits and communication systems above suspended ceilings, and for fastening raceways to trapeze supports.

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, EMT, IMC and RMC may be supported by openings through structure members, according to 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 (90 kg).
- 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 (100 mm) thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches (100 mm) thick.
 - 6. To Steel: Beam clamps (MSS SP-58, Type 19, 21, 23, 25, or 27), complying with MSS SP-69.
 - 7. To Light Steel: Sheet metal screws.
 - 8. 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 comply with seismic-restraint strength and anchorage requirements.
- E. Drill holes for expansion anchors in concrete at locations and to depths that avoid the need for reinforcing bars.

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

- A. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.
- B. Field Welding: Comply with AWS D1.1/D1.1M.

3.4 CONCRETE BASES

- A. Construct concrete bases of dimensions indicated but not less than 4 inches (100 mm) 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 (20.7-MPa), 28-day compressive-strength concrete.
- 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.

END OF SECTION 260529

SECTION 260533 - RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Metal conduits and fittings.
2. Nonmetallic conduits and fittings.
3. Metal wireways and auxiliary gutters.
4. Surface raceways.
5. Boxes, enclosures, and cabinets.
6. Handholes and boxes for exterior underground cabling.

1.2 ACTION SUBMITTALS

- ##### A. Product Data:
- For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.

1.3 INFORMATIONAL SUBMITTALS

- ##### A. Seismic Qualification Data:
- Certificates, for enclosures, cabinets, and conduit racks and their mounting provisions, including those for internal components, from manufacturer.

PART 2 - PRODUCTS

2.1 METAL CONDUITS AND FITTINGS

A. Metal Conduit:

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. Allied Tube & Conduit; a part of Atkore International.
 - b. Electri-Flex Company.
 - c. O-Z/Gedney; a brand of Emerson Industrial Automation.
 - d. Patriot Aluminum Products, LLC.
 - e. Perma-Cote.
 - f. Picoma Industries, Inc.
 - g. Plasti-Bond.
 - h. Republic Conduit.
 - i. Southwire Company.
 - j. Thomas & Betts Corporation; A Member of the ABB Group.
 - k. Western Tube and Conduit Corporation.

2. 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.
3. GRC: Comply with ANSI C80.1 and UL 6.
4. IMC: Comply with ANSI C80.6 and UL 1242.
5. PVC-Coated Steel Conduit: PVC-coated rigid steel conduit.
 - a. Comply with NEMA RN 1.
 - b. Coating Thickness: 0.040 inch, minimum.
6. EMT: Comply with ANSI C80.3 and UL 797.
7. FMC: Comply with UL 1; zinc-coated steel.
8. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.

B. Metal Fittings: Comply with NEMA FB 1 and UL 514B.

1. Listing and Labeling: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Fittings, General: Listed and labeled for type of conduit, location, and use.
3. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 1203 and NFPA 70.
4. Fittings for EMT:
 - a. Material: Steel.
 - b. Type: Setscrew.
5. 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.
6. Coating for Fittings for PVC-Coated Conduit: Minimum thickness of 0.040 inch, with overlapping sleeves protecting threaded joints.

C. Joint Compound for IMC or GRC: 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 AND FITTINGS

A. Nonmetallic Conduit:

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. Arnco Corporation.
 - b. CANTEX INC.
 - c. CertainTeed Corporation.
 - d. Champion Fiberglass, Inc.
 - e. Condux International, Inc.
 - f. Electri-Flex Company.
 - g. FRE Composites.
 - h. Kraloy.
 - i. Lamson & Sessions.
 - j. Niedax Inc.
 - k. RACO; Hubbell.
 - l. Thomas & Betts Corporation; A Member of the ABB Group.

- B. Listing and Labeling: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 - 1. RNC: Type EPC-40-PVC or Type EPC-80-PVC, complying with NEMA TC 2 and UL 651 unless otherwise indicated.
 - 2. LFNC: Comply with UL 1660.
 - 3. Rigid HDPE: Comply with UL 651A.
 - 4. Continuous HDPE: Comply with UL 651B.
 - 5. ENT: Comply with NEMA TC 13 and UL 1653.

- C. Nonmetallic Fittings:
 - 1. Fittings, General: Listed and labeled for type of conduit, location, and use.
 - 2. Fittings for ENT and RNC: Comply with NEMA TC 3; match to conduit or tubing type and material.
 - 3. Fittings for LFNC: Comply with UL 514B.
 - 4. Solvents and Adhesives: As recommended by conduit manufacturer.

2.3 STANDARD CONDUIT SEALS

- A. 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:
 - 1. American Polywater Corporation
 - 2. Dura-Line, Inc.
 - 3. FS3, Inc.

- B. Description: Sealing compound for use in underground conduit to prevent water and gas infiltration in non-classified locations.
 - 1. Semi-permanent, re-enterable seal.
 - 2. Compatible with PVC, rigid steel, EMT, IMC, fiberglass and polyethylene conduits.
 - 3. Keeps water, acids, greases, gases, insects, rodents, etc., out of the conduit.
 - 4. Two-part high-expansion urethane foam with 98% closed cell content.
 - 5. Cured compressive strength of 300 lbs. (ASTM D790), tensile strength of 250 lbs. (ASTM D1623), and flexural strength of 450 lbs. (ASTM D790) and temperature range of -20° to 200°F.
 - 6. Cured sealant will be capable of holding 10 psi water pressure continuously.
 - 7. Meets NEC requirements for raceway seals per Articles 225.27, 230.8 and 300.5
 - 8. FST™ Sealant or equivalent.

2.4 METAL WIREWAYS AND AUXILIARY GUTTERS

- A. 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:
 - 1. B-line, an Eaton business.
 - 2. Hoffman; a brand of Pentair Equipment Protection.
 - 3. MonoSystems, Inc.

- B. Description: Sheet metal, complying with UL 870 and NEMA 250, Type 1, Type 3R, Type 4 or Type 12 unless otherwise indicated, and sized 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.
- C. 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.
- D. Wireway Covers: Screw-cover type unless otherwise indicated.
- E. Finish: Manufacturer's standard enamel finish.

2.5 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. Manufacturer's standard enamel finish in color selected by Architect.
 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. Mono-Systems, Inc.
 - b. Panduit Corp.
 - c. Wiremold / Legrand.

2.6 J-HOOKS

- A. Description: Prefabricated sheet metal cable supports for low-voltage cables (lighting controls).
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Eaton, B-line.
 2. Panduit Corp.
 3. Wiremold / Legrand.
- C. Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.

2.7 BOXES, ENCLOSURES, AND CABINETS

- A. 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:
 1. Crouse-Hinds, an Eaton business.
 2. Erickson Electrical Equipment Company.
 3. Hoffman; a brand of Pentair Equipment Protection.
 4. Hubbell Incorporated.
 5. Hubbell Incorporated; Wiring Device-Kellems.

6. Milbank Manufacturing Co.
 7. MonoSystems, Inc.
 8. Oldcastle Enclosure Solutions.
 9. O-Z/Gedney; a brand of Emerson Industrial Automation.
 10. RACO; Hubbell.
 11. Stahlin Non-Metallic Enclosures.
 12. Thomas & Betts Corporation; A Member of the ABB Group.
- B. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.
- C. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.
- D. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, aluminum, Type FD, with gasketed cover.
- E. Nonmetallic Outlet and Device Boxes: Comply with NEMA OS 2 and UL 514C.
- F. Metal Floor Boxes. See drawings for differing floor box requirements based on location, floor material and box use.
1. All floor boxes shall be:
 - a. Fully adjustable.
 - b. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 2. Specific conditions include:
 - a. Concrete floors (3" min. pour depth) - 4-gang floor box with corrosion resistant coating for on-grade use and up to 2" conduit feed.
 - b. Raised access floors - 4-gang floor box for up to 2" conduit feed.
 - c. Fire rated poke-through floor box for elevated concrete slabs:
 - 1) Small - 3" diameter core.
 - 2) Large - 8" diameter for up to 2" conduit feed.
 - d. Flush, round single surface floor box for concrete floors with up to 1" conduit feed.
 - e. Tombstone pedestal floor box with 1" conduit feed.
 3. Include all interior box dividers, flanges, mounting hardware, wiring devices, faceplates, etc. to provide complete floor box outlet in accordance with drawings.
- G. Luminaire Outlet Boxes: Nonadjustable, designed for attachment of luminaire weighing 50 lb (23 kg). Outlet boxes designed for attachment of luminaires weighing more than 50 lb (23 kg) shall be listed and marked for the maximum allowable weight.
- H. Paddle Fan Outlet Boxes: Nonadjustable, designed for attachment of paddle fan weighing 70 lb (32 kg).
1. Listing and labeling: Paddle fan outlet boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- I. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
- J. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, cast aluminum with gasketed cover.

- K. Box extensions used to accommodate new building finishes shall be of same material as recessed box.
- L. Device Box Dimensions: 4 inches square by 2-1/8 inches deep with single gang mud ring unless device(s) requires otherwise.
- M. Gangable boxes are allowed for 6-gang or larger.
- N. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 1, Type 3R, Type 4 or Type 12 with continuous-hinge cover with flush latch unless otherwise indicated.
 - 1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
 - 2. Nonmetallic Enclosures: Plastic.
 - 3. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.
- O. Cabinets:
 - 1. NEMA 250, Type 1, Type 3R or Type 12 galvanized-steel box 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.

2.8 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.
- B. Polymer-Concrete Handholes and Boxes with Polymer-Concrete Cover: Molded of sand and aggregate, bound together with polymer resin, and reinforced with steel, fiberglass, or a combination of the two.
 - 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. Armorcast Products Company.
 - b. NewBasis.
 - c. Oldcastle Enclosure Solutions.
 - d. Oldcastle Precast, Inc.
 - e. Quazite (Hubbell).
 - 2. Standard: Comply with ANSI/SCTE 77.
 - 3. Load Ratings:
 - a. Tier 5 for non-traffic areas and sidewalk applications with a safety factor for occasional non-deliberate vehicular traffic.

- b. Tier 15 for driveway, parking lot, and off-road applications subject to occasional non-deliberate heavy vehicular traffic.
 - c. AASHTO H-20 for roadways and other deliberate vehicular traffic applications.
4. Configuration: Designed for flush burial with open bottom unless otherwise indicated.
 5. Cover: Weatherproof, secured by tamper-resistant locking devices and having structural load rating consistent with enclosure and handhole location.
 6. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
 7. Cover Legend: Molded lettering, "ELECTRIC" or "COM" as indicated on drawings.
 8. Conduit Entrance Provisions: Conduit-terminating fittings shall mate with entering ducts for secure, fixed installation in enclosure wall.

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: RNC, Type EPC-40-PVC in fine bedded trench.
 4. Under roadways and paved or concrete walkways: Type EPC-80-PVC in fine bedded trench.
 5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
 6. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.
- B. Indoors: Apply raceway products as specified below unless otherwise indicated.
 1. Exposed, Not Subject to Physical Damage: EMT.
 2. Exposed and Subject to Severe Physical Damage: GRC. Raceway locations include the following:
 - a. Loading dock.
 - b. Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.
 - c. Commercial garages (up to 48" AFF).
 3. Concealed in Ceilings and Interior Walls and Partitions: EMT.
 4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
 5. Damp or Wet Locations: GRC.
 6. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4 nonmetallic in institutional and commercial kitchens and damp or wet locations.
 7. Concealed in CMU block wall: Type EPC-40-PVC.
- C. Minimum Raceway Size: 1 inch trade size for telecom/data and 3/4 inch trade size for all other applications.
- 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, 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.

- E. Install surface raceways only where specifically indicated on Drawings.
- F. Install nonmetallic conduit or tubing for protecting bare grounding conductors.
- G. Do not install nonmetallic conduit where ambient temperature exceeds 120 deg F (49 deg C).

3.2 LOW VOLTAGE CABLE INSTALLATION

- A. Any low voltage cables in exposed or finished areas shall be in raceway.
- B. In accordance with NEC 300.11 and NEC 800.24, any low voltage cables installed in accessible ceilings without conduit, including lighting control cables, shall be as follows:
 1. Cables shall not be draped over air ducts, pipes, or conduits, shall not rest on the ceiling grid or tiles, and shall not use ceiling grid support wires or rods.
 2. Cables shall be supported using j-hooks at intervals not to exceed 48". J-hooks shall be attached to the structure with dedicated support wires, and a j-hook shall be installed at each change in cabling direction.
 3. Written approval shall be obtained from the IT designer prior to any use of communications system cable/ladder tray or j-hooks. Wherever cable tray or communication system j-hooks are used, the lighting controls cabling shall be bundled with cable ties. Any non-metallic cable ties used to bundle the cables shall be plenum rated.

3.3 INSTALLATION

- A. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for hangers and supports.
- B. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.
- C. Do not install raceways or electrical items on any "explosion-relief" walls or rotating equipment.
- D. Do not fasten conduits onto the bottom side of a metal deck roof.
- E. 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.
- F. Whenever routed in parallel, maintain 12" minimum separation between communications conduits and power conduits. Where these conduits must intersect, cross at 90 degrees.
- G. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for hangers and supports.

- H. 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.
- I. Make bends in raceway using large-radius preformed ells. Field bending shall be according to NFPA 70 minimum radii requirements. Use only equipment specifically designed for material and size involved.
- J. Conceal conduit and EMT within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.
- K. Support conduit within 12 inches of enclosures to which attached.
- L. Raceways Below Slab:
 - 1. Conduits are permitted under the slab in the base material only (not within the concrete slab).
 - 2. All routing must be approved by the structural engineer prior to rough-in.
 - 3. Arrange stub-ups so that curved portions of bends are not visible above finished slab.
 - 4. Change from RNC, Type EPC-40-PVC to PVC Coated GRC bend and thru slab stub before rising above floor.
- M. Stub-ups to Above Recessed Ceilings:
 - 1. Use EMT for raceways.
 - 2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.
- N. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.
- O. Coat field-cut threads on PVC-coated raceway with a corrosion-preventing conductive compound prior to assembly.
- P. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors including conductors smaller than No. 4 AWG.
- Q. Install raceways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.
- R. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.
- S. Cut conduit perpendicular to the length. For conduits 2-inch trade size and larger, use roll cutter or a guide to make cut straight and perpendicular to the length.
- T. 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.
- U. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb (90-kg) 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.

- V. 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. Support surface raceway according to manufacturer's written instructions. Tape and glue are not acceptable support methods.
- W. Install raceway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces.
- X. Standard Conduit Seals:
1. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all raceways at the following points:
 - a. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
 - b. Where an underground service raceway enters a building or structure.
 - c. Conduit extending from interior to exterior of building.
 - d. Conduit extending into pressurized duct and equipment.
 - e. Conduit extending into pressurized zones that are automatically controlled to maintain different pressure set points.
 - f. Where otherwise required by NFPA 70.
- Y. Expansion-Joint Fittings:
1. Install in each run of aboveground RNC that is located where environmental temperature change may exceed 30 deg F (17 deg C) and that has straight-run length that exceeds 25 feet (7.6 m).
 2. Install type and quantity of fittings that accommodate temperature change listed for each of the following locations:
 - a. Outdoor Locations Not Exposed to Direct Sunlight: 125 deg F (70 deg C) temperature change.
 - b. Outdoor Locations Exposed to Direct Sunlight: 155 deg F (86 deg C) temperature change.
 - c. Indoor Spaces Connected with Outdoors without Physical Separation: 125 deg F (70 deg C) temperature change.
 - d. Attics: 135 deg F (75 deg C) temperature change.
 3. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per degree F of temperature change for PVC conduits.
 4. Install expansion fittings at all locations where conduits cross building or structure expansion joints.
 5. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.
- Z. Flexible Conduit Connections: Comply with NEMA RV 3. Use a maximum of 72 inches of flexible conduit for recessed and semi-recessed luminaires, equipment subject to vibration, noise transmission, or movement; and for transformers and motors.

1. Use LFMC in damp or wet locations subject to severe physical damage.
 2. Use LFMC or LFNC in damp or wet locations not subject to severe physical damage.
- AA. Mount boxes at heights 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.
- BB. 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 the box and cover plate or the supported equipment and box.
- CC. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.
- DD. Locate boxes so that cover or plate will not span different building finishes.
- EE. 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.
- FF. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.
- GG. Set metal floor boxes level and flush with finished floor surface.
- HH. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.

3.4 INSTALLATION OF UNDERGROUND CONDUIT

A. Direct-Buried Conduit:

1. Excavation
 - a. Excavate trenches to indicated depths.
 - b. Excavate trenches to uniform widths to provide 12 inches on each side of conduits. Excavate trench walls vertically from trench bottom to 12 inches higher than top of conduits UNO.
 - c. Excavate trenches sufficiently wide to maintain 12" minimum separation between communications conduits and all power conduits.
 - d. Excavate and shape trench bottoms to provide uniform bearing and support of conduits. Shape subgrade to provide continuous support for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.
 - e. Trenches in Tree- and Plant-Protection Zones:
 - 1) Hand-excavate to indicated lines, cross sections, elevations, and subgrades. Use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.
 - 2) Do not cut main lateral roots or taproots; cut only smaller roots that interfere with installation of utilities.
2. Initial Backfill
 - a. Place backfill on subgrades free of mud, frost, snow, or ice.

- b. Place and compact bedding course on trench bottoms. Shape bedding course to provide continuous support for joints, fittings, and bodies of conduits.
 3. Install manufactured duct elbows for stub-up at poles and equipment and at building entrances through floor unless otherwise indicated. Encase elbows for stub-up ducts throughout length of elbow.
 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. Backfill - 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.
 - a. Trenches under Footings: Backfill trenches excavated under footings and within 18 inches of bottom of footings with satisfactory soil; fill with concrete to elevation of bottom of footings.
 - b. Trenches under Roadways: Provide 4-inch thick, concrete-base slab support for conduits less than 30 inches below surface of roadways. After installing and testing, completely encase piping or conduit in a minimum of 4 inches of concrete before backfilling or placing roadway subbase course.
 - c. Initial Backfill: Place and compact initial backfill of subbase material, free of particles larger than 1 inch in any dimension, to a height of 12 inches over the conduits. Carefully compact initial backfill under conduit haunches and compact evenly up on both sides and along the full length of conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.
 - d. 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.
 6. Underground Warning Tape: Comply with requirements in Section 260553 "Identification for Electrical Systems."
 7. Compaction - Firmly hand tamp backfill around conduit to provide maximum supporting strength. Coordinate all requirements with site civil specifications. Prior to commencing work, the more stringent requirement shall take precedence.
 - a. Compact each layer of initial and final backfill soil material at 95 percent.

3.5 INSTALLATION OF UNDERGROUND HANDHOLES AND BOXES

- A. Install handholes and boxes level and plumb and with orientation and depth coordinated with connecting conduits to minimize bends and deflections required for proper entrances.
- B. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 1/2-inch sieve to No. 4 sieve and compacted to same density as adjacent undisturbed earth.

- C. Elevation: In paved areas, set so cover surface will be flush with finished grade. Set covers of other enclosures 1 inch above finished grade.
- D. Where required, field-cut openings for conduits according to enclosure manufacturer's written instructions. Cut wall of enclosure with a tool designed for material to be cut. Size holes for terminating fittings to be used, and seal around penetrations after fittings are installed.

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 Section 260544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.7 FIRESTOPPING

- A. Install firestopping at penetrations of fire-rated floor and wall assemblies.

3.8 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 260533

SECTION 260544 - SLEEVES AND SLEEVE SEALS FOR ELECTRICAL RACEWAYS AND CABLING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Sleeves for raceway and cable penetration of non-fire-rated construction walls and floors.
2. Sleeve-seal systems.
3. Sleeve-seal fittings.
4. Grout.
5. Silicone sealants.

1.2 ACTION SUBMITTALS

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

PART 2 - PRODUCTS

2.1 SLEEVES

A. Wall Sleeves:

1. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, plain ends.

- B. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies: Galvanized-steel sheet; 0.0239-inch (0.6-mm) minimum thickness; round tube closed with welded longitudinal joint, with tabs for screw-fastening the sleeve to the board.

C. Sleeves for Rectangular Openings:

1. Material: Galvanized sheet steel.
2. Minimum Metal Thickness:
 - a. For sleeve cross-section rectangle perimeter less than 50 inches (1270 mm) and with no side larger than 16 inches (400 mm), thickness shall be 0.052 inch (1.3 mm).
 - b. For sleeve cross-section rectangle perimeter 50 inches (1270 mm) or more and one or more sides larger than 16 inches (400 mm), thickness shall be 0.138 inch (3.5 mm).

2.2 SLEEVE-SEAL SYSTEMS

- A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.

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. Advance Products & Systems, Inc.
 - b. CALPICO, Inc.
 - c. Metraflex Company (The).
 - d. Pipeline Seal and Insulator, Inc.
 - e. Proco Products, Inc.
 - f. 3M
2. Sealing Elements: EPDM rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
3. Pressure Plates: Stainless Steel.
4. Connecting Bolts and Nuts: Stainless Steel of length required to secure pressure plates to sealing elements.

2.3 SLEEVE-SEAL FITTINGS

- A. Description: Manufactured plastic, sleeve-type, waterstop assembly made for embedding in concrete slab or wall. Unit shall have plastic or rubber waterstop collar with center opening to match piping OD.

2.4 GROUT

- A. Description: Non-shrink; recommended for interior and exterior sealing openings in non-fire-rated walls or floors.
- B. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.
- C. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.
- D. Packaging: Premixed and factory packaged.

2.5 SILICONE SEALANTS

- A. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below.
 1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces that are not fire rated.
- B. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, non-shrinking foam.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION FOR NON-FIRE-RATED ELECTRICAL PENETRATIONS

- A. Comply with NECA 1.
- B. Comply with NEMA VE 2 for cable tray and cable penetrations.
- C. Sleeves for Conduits Penetrating Above-Grade Non-Fire-Rated Concrete and Masonry-Unit Floors and Walls:
 - 1. Interior Penetrations of Non-Fire-Rated Walls and Floors:
 - a. Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint.
 - b. Seal space outside of sleeves with mortar or grout. Pack sealing material solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect material while curing.
 - 2. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
 - 3. Size pipe sleeves to provide 1/4-inch (6.4-mm) annular clear space between sleeve and raceway or cable unless sleeve seal is to be installed, **unless seismic criteria require different clearance**.
 - 4. Install sleeves for wall penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of walls. Cut sleeves to length for mounting flush with both surfaces of walls. Deburr after cutting.
 - 5. Install sleeves for floor penetrations. Extend sleeves installed in floors 2 inches (50 mm) above finished floor level. Install sleeves during erection of floors.
- D. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies:
 - 1. Use circular metal sleeves unless penetration arrangement requires rectangular sleeved opening.
 - 2. Seal space outside of sleeves with approved joint compound for gypsum board assemblies.
- E. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work, and in accordance with roof system manufacturer's warranty requirements.
- F. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.
- G. Underground, Exterior-Wall and Floor Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for 1-inch (25-mm) annular clear space between raceway or cable and sleeve for installing sleeve-seal system.

3.2 SLEEVE-SEAL-SYSTEM INSTALLATION

- A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at raceway entries into building.

- B. Install type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.3 SLEEVE-SEAL-FITTING INSTALLATION

- A. Install sleeve-seal fittings in new walls and slabs as they are constructed.
- B. Assemble fitting components of length to be flush with both surfaces of concrete slabs and walls. Position waterstop flange to be centered in concrete slab or wall.
- C. Secure nailing flanges to concrete forms.
- D. Using grout, seal the space around outside of sleeve-seal fittings.

END OF SECTION 260544

SECTION 260548.16 - SEISMIC CONTROLS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Restraint channel bracings.
 2. Restraint cables.
 3. Seismic-restraint accessories.
 4. Mechanical anchor bolts.

1.2 ACTION SUBMITTALS

- A. Delegated-Design Submittal: For each seismic-restraint device.
1. Include design calculations and details for selecting seismic restraints complying with performance requirements, design criteria, and analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 2. Design Calculations: Calculate static and dynamic loading caused by equipment weight, operation, and seismic and wind forces required to select seismic and wind restraints and for designing vibration isolation bases.
 - a. Coordinate design calculations with wind load calculations required for equipment mounted outdoors. Comply with requirements in other Sections for equipment mounted outdoors.
 3. Seismic and Wind Restraint Details:
 - a. Design Analysis: To support selection and arrangement of seismic and wind restraints. Include calculations of combined tensile and shear loads.
 - b. Details: Indicate fabrication and arrangement. Detail attachments of restraints to the restrained items and to the structure. Show attachment locations, methods, and spacings. Identify components, list their strengths, and indicate directions and values of forces transmitted to the structure during seismic events. Indicate association with vibration isolation devices.
 - c. Coordinate seismic-restraint and vibration isolation details with wind-restraint details required for equipment mounted outdoors. Comply with requirements in other Sections for equipment mounted outdoors.
 - d. In lieu of design analysis and details, preapproval documentation by OSHPD, ICC-ES or another agency acceptable to authorities having jurisdiction are acceptable.

1.3 QUALITY ASSURANCE

- A. Comply with seismic-restraint requirements in the IBC unless requirements in this Section are more stringent.
- B. Seismic-restraint devices shall have horizontal and vertical load testing and analysis. They shall bear anchorage preapproval from OSHPD in addition to preapproval, showing maximum seismic-

restraint ratings, by ICC-ES or another agency acceptable to authorities having jurisdiction. Ratings based on independent testing are preferred to ratings based on calculations. If preapproved ratings are not available, submittals based on independent testing are preferred. Calculations (including combining shear and tensile loads) that support seismic-restraint designs must be signed and sealed by a qualified professional engineer.

- C. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Wind-Restraint Loading:

1. Basic Wind Speed (ultimate): 100 mph.
2. Minimum 10 lb/sq. ft. (48.8 kg/sq. m) multiplied by maximum area of component projected on vertical plane normal to wind direction and 45 degrees either side of normal.

B. Seismic-Restraint Loading:

1. Design seismic restraints for components for seismic design forces defined in Chapter 13 of ASCE 7-10.
 - a. Building Risk Category: **III**.
 - b. Design Spectral Response Acceleration at Short Periods, $S_{DS} = 0.569$.
 - c. Component Importance Factor, $I_p = 1.0$ for electrical equipment except for components required for life-safety purposes after an earthquake such as egress lighting and fire alarm control panel where $I_p = 1.5$.
 - d. Component Response Modification Factor, R_p : See Table 13.6-1 of ASCE 7-10
 - e. Component Amplification Factor, a_p : See Table 13.6-1 of ASCE 7-10

2.2 RESTRAINT CHANNEL BRACINGS

A. 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:

1. Atkore Unistrut
2. B-line, an Eaton business.
3. Hilti, Inc.
4. Mason Industries, Inc.

B. Description: MFMA-4, shop- or field-fabricated bracing assembly made of slotted steel channels with accessories for attachment to braced component at one end and to building structure at the other end, with other matching components, and with corrosion-resistant coating; rated in tension, compression, and torsion forces.

2.3 RESTRAINT CABLES

A. 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:

1. Gripple Inc.

2. Kinetics Noise Control, Inc.
3. Vibration & Seismic Technologies, LLC.
4. Vibration Mountings & Controls, Inc.

- B. Restraint Cables: ASTM A 603 galvanized steel cables. End connections made of steel assemblies with thimbles, brackets, swivel, and bolts designed for restraining cable service; with a minimum of two clamping bolts for cable engagement.

2.4 SEISMIC-RESTRAINT ACCESSORIES

- A. 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:

1. Atkore Unistrut
2. B-line, an Eaton business.
3. Kinetics Noise Control, Inc.
4. Mason Industries, Inc.

- B. Hanger-Rod Stiffener: Steel tube or steel slotted-support-system sleeve with internally bolted connections to hanger rod.

- C. Hinged and Swivel Brace Attachments: Multifunctional steel connectors for attaching hangers to rigid channel bracings and restraint cables.

- D. Bushings for Floor-Mounted Equipment Anchor Bolts: Neoprene bushings designed for rigid equipment mountings and matched to type and size of anchor bolts and studs.

- E. Bushing Assemblies for Wall-Mounted Equipment Anchorage: Assemblies of neoprene elements and steel sleeves designed for rigid equipment mountings and matched to type and size of attachment devices used.

- F. Resilient Isolation Washers and Bushings: One-piece, molded, oil- and water-resistant neoprene, with a flat washer face.

2.5 MECHANICAL ANCHOR BOLTS

- A. 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:

1. B-line, an Eaton business.
2. Hilti, Inc.
3. Kinetics Noise Control, Inc.
4. Mason Industries, Inc.

- B. Mechanical Anchor Bolts: Drilled-in and stud-wedge or female-wedge type in zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488.

PART 3 - EXECUTION

3.1 APPLICATIONS

- A. Multiple Raceways or Cables: Secure raceways and cables to trapeze member with clamps complying with delegated design submittal requirements.
- B. Hanger-Rod Stiffeners: Install hanger-rod stiffeners where indicated or scheduled on Drawings to receive them and where required to prevent buckling of hanger rods caused by seismic forces.
- C. Strength of Support and Seismic-Restraint Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static and seismic loads within specified loading limits.

3.2 SEISMIC-RESTRAINT DEVICE INSTALLATION

- A. Coordinate the location of embedded connection hardware with supported equipment attachment and mounting points and with requirements for concrete reinforcement and formwork.
- B. Equipment and Hanger Restraints:
 - 1. Install resilient, bolt-isolation washers on equipment anchor bolts where clearance between anchor and adjacent surface exceeds 0.125 inch (3.2 mm).
- C. Install cables so they do not bend across edges of adjacent equipment or building structure.
- D. Install bushing assemblies for mounting bolts for wall-mounted equipment, arranged to provide resilient media where equipment or equipment-mounting channels are attached to wall.
- E. Attachment to Structure: If specific attachment is not indicated, anchor bracing to structure at flanges of beams, at upper truss chords of bar joists, or at concrete members.
- F. Drilled-in Anchors:
 - 1. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Locate and avoid prestressed tendons, electrical and telecommunications conduit, and gas lines.
 - 2. Do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.
 - 3. Wedge Anchors: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors shall be installed with sleeve fully engaged in the structural element to which anchor is to be fastened.
 - 4. Adhesive Anchors: Clean holes to remove loose material and drilling dust prior to installation of adhesive. Place adhesive in holes proceeding from the bottom of the hole and progressing toward the surface in such a manner as to avoid introduction of air pockets in the adhesive.
 - 5. Set anchors to manufacturer's recommended torque using a torque wrench.
 - 6. Install zinc-coated steel anchors for interior and stainless-steel anchors for exterior applications.

3.3 ACCOMMODATION OF DIFFERENTIAL SEISMIC MOTION

- A. Install flexible connections in runs of raceways, cables, wireways, cable trays, and busways where they cross seismic joints, where adjacent sections or branches are supported by different structural elements, and where connection is terminated to equipment that is anchored to a different structural element from the one supporting them as they approach equipment.

END OF SECTION 260548.16

SECTION 260553 - 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. Color and legend requirements for raceways, conductors, and warning labels and signs.
 - 2. Tapes and stencils.
 - 3. Signs.
 - 4. Cable ties.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Comply with ASME A13.1.
- B. Comply with NFPA 70.
- C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.
- D. Comply with ANSI Z535.4 for safety signs and labels.
- E. Comply with NFPA 70E requirements for arc-flash warning labels.
- F. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

2.2 COLOR AND LEGEND REQUIREMENTS

- A. Raceways and Cables Carrying Circuits within Buildings. Identify the covers of each junction and pull box of the following systems with paint as follows:
 - 1. Battery or Generator Backed up Emergency System: Orange
 - 2. Fire Detection and Alarm System: Red
 - 3. Systems with voltage greater than 600V: Yellow
 - 4. Direct current systems (Solar PV system): Green
 - 5. Affix label with black letters on color noted above indicating voltage and system or service type.

- B. Conductor Color-Coding for Phase and Voltage-Level Identification, 600 V or Less: Use colors listed below for ungrounded service, feeder and branch-circuit conductors.
1. Utilize factory applied, colored insulation for No. 8 AWG and smaller.
 2. If Authority Having Jurisdiction permits, for sizes larger than No. 8 AWG, where conductors with factory colored insulation are not commonly available, colored non-aging, plastic tape may be field applied. Apply in half-lapped turns for a minimum distance of 6 inches (150 mm) 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.
 3. Colors for Three-Phase Wye, 208/120V Circuits:
 - a. Phase A: Black.
 - b. Phase B: Red.
 - c. Phase C: Blue.
 - d. Neutral: White.
 4. Colors for Three-Phase, 480/277V Circuits:
 - a. Phase A: Brown.
 - b. Phase B: Orange.
 - c. Phase C: Yellow.
 - d. Neutral: Gray.
 5. Color for Equipment Grounds: Bare copper or Green.
 6. Lighting Circuit Switched Legs and 3-way/4-way Traveler: Color unique to those listed above.
- C. Warning Label Colors:
1. Identify system voltage with black letters on an orange background.
- D. Warning labels and signs shall include, but are not limited to, the following legends:
1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
 2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES (915 MM)."
 3. Arc Flash Warning: "WARNING – KEEP CLEAR. RISK OF ELECTRIC SHOCK OR ARC FLASH. PPE REQUIRED."
- E. Equipment Identification Labels:
1. Black letters on a white field, or white letters on a black field.
 2. Include equipment designation and circuit.
 3. Exterior equipment labels shall have a rivet or screw mounted label on the exterior door.
 4. 1" minimum height letters for service disconnect and emergency shut-off switches.
 5. 1/2" minimum height letters for panelboards, switchboards, relay enclosures and transformers.
 6. 1/4" minimum height letters for disconnect switches and motor starters.
 7. 1/8" minimum height letters for device coverplates (where required).

2.3 TAPES AND STENCILS

- A. Self-Adhesive Vinyl Tape: Colored, heavy duty, waterproof, fade resistant; not less than 3 mils (0.08 mm) thick by 1 to 2 inches (25 to 50 mm) wide; compounded for outdoor use.
- B. Floor Marking Tape: 2-inch- (50-mm-) wide, 5-mil (0.125-mm) pressure-sensitive vinyl tape, with yellow and black stripes and clear vinyl overlay.
- C. Underground-Line Warning Tape:
 - 1. Tape:
 - a. Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical and communications utility lines.
 - b. Printing on tape shall be permanent and shall not be damaged by burial operations.
 - c. Tape material and ink shall be chemically inert and not subject to degradation when exposed to acids, alkalis, and other destructive substances commonly found in soils.
 - 2. Color and Printing:
 - a. Comply with ANSI Z535.1, ANSI Z535.2, ANSI Z535.3, ANSI Z535.4, and ANSI Z535.5.
 - b. Inscriptions for Red-Colored Tapes: "ELECTRIC LINE, HIGH VOLTAGE".
 - c. Inscriptions for Orange-Colored Tapes: "TELEPHONE CABLE, CATV CABLE, COMMUNICATIONS CABLE, OPTICAL FIBER CABLE".
 - 3. Type:
 - a. Detectable three-layer laminate, consisting of a printed pigmented polyolefin film, a solid aluminum-foil core, and a clear protective film that allows inspection of the continuity of the conductive core; bright colored, continuous-printed on one side with the inscription of the utility, compounded for direct-burial service.
 - b. Width: 3 inches (75 mm).
 - c. Overall Thickness: 5 mils (0.125 mm).
 - d. Foil Core Thickness: 0.35 mil (0.00889 mm).
 - e. Weight: 28 lb/1000 sq. ft. (13.7 kg/100 sq. m).
 - f. Tensile according to ASTM D 882: 70 lbf (311.3 N) and 4600 psi (31.7 MPa).

2.4 SIGNS

- A. Baked-Enamel Signs:
 - 1. Preprinted aluminum signs, high-intensity reflective, punched or drilled for fasteners, with colors, legend, and size required for application.
 - 2. 1/4-inch (6.4-mm) grommets in corners for mounting.
 - 3. Nominal Size: 7 by 10 inches (180 by 250 mm).
- B. Laminated Acrylic or Melamine Plastic Signs:
 - 1. Engraved legend.
 - 2. Thickness:
 - a. For signs up to 20 sq. in. (129 sq. cm), minimum 1/16 inch (1.6 mm) thick.
 - b. For signs larger than 20 sq. in. (129 sq. cm), 1/8 inch (3.2 mm) thick.

- c. Engraved legend with black letters on white face
- d. Punched or drilled for mechanical fasteners with 1/4-inch (6.4-mm) grommets in corners for mounting.
- e. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

2.5 CABLE TIES

- A. General-Purpose Cable Ties: Fungus inert, self-extinguishing, one piece, self-locking, and Type 6/6 nylon.
 - 1. Minimum Width: 3/16 inch (5 mm).
 - 2. Tensile Strength at 73 Deg F (23 Deg C) according to ASTM D 638: 12,000 psi (82.7 MPa).
 - 3. Temperature Range: Minus 40 to plus 185 deg F (Minus 40 to plus 85 deg C).
 - 4. Color: Black, except where used for color-coding.
- B. UV-Stabilized Cable Ties: Fungus inert, designed for continuous exposure to exterior sunlight, self-extinguishing, one piece, self-locking, and Type 6/6 nylon.
 - 1. Minimum Width: 3/16 inch (5 mm).
 - 2. Tensile Strength at 73 Deg F (23 Deg C) according to ASTM D 638: 12,000 psi (82.7 MPa).
 - 3. Temperature Range: Minus 40 to plus 185 deg F (Minus 40 to plus 85 deg C).
 - 4. Color: Black.
- C. Plenum-Rated Cable Ties: Self-extinguishing, UV stabilized, one piece, and self-locking.
 - 1. Minimum Width: 3/16 inch (5 mm).
 - 2. Tensile Strength at 73 Deg F (23 Deg C) according to ASTM D 638: 7000 psi (48.2 MPa).
 - 3. UL 94 Flame Rating: 94V-0.
 - 4. Temperature Range: Minus 50 to plus 284 deg F (Minus 46 to plus 140 deg C).
 - 5. Color: Black.

2.6 MISCELLANEOUS IDENTIFICATION PRODUCTS

- A. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Retain 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 COORDINATION

- A. Verify and coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and operation and maintenance manual. Use consistent designations throughout Project.

- B. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and operation and maintenance manual.
- C. Coordinate installation of identifying devices with location of access panels and doors.
- D. Install identifying devices before installing acoustical ceilings and similar concealment.

3.2 INSTALLATION

- A. Verify identity of each item before installing identification products.
- B. Apply identification devices to surfaces that require finish after completing finish work.
- C. Install signs with approved legend to facilitate proper identification, operation, and maintenance of electrical systems and connected items.
- D. Self-Adhesive Identification Products: Before applying electrical identification products, clean substrates of substances that could impair bond, using materials and methods recommended by manufacturer of identification product.
- E. Self-Adhesive Identification Products used on the exterior of the building: Before applying electrical identification products, clean substrates of substances that could impair bond, using materials and methods recommended by manufacturer of identification product. Labels shall have a rivet or screw mounted on each side of the label, located on the exterior door.
- F. Elevated Components: Increase sizes of labels, signs, and letters to those appropriate for viewing from the floor.
- G. Floor Marking Tape: Apply stripes to finished surfaces following manufacturer's written instructions.
- H. Underground Line Warning Tape:
 - 1. During backfilling of trenches, install continuous underground-line warning tape directly above cable or raceway at 6 to 8 inches (150 to 200 mm) below finished grade. Use multiple tapes where width of multiple lines installed in a common trench or concrete envelope exceeds 16 inches (400 mm) overall.
 - 2. Install underground-line warning tape for direct-buried cables and cables in raceways.
- I. Laminated Acrylic or Melamine Plastic Signs:
 - 1. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
- J. Cable Ties: General purpose, for attaching tags, except as listed below:
 - 1. Outdoors: UV-stabilized nylon.
 - 2. In Spaces Handling Environmental Air: Plenum rated.

3.3 IDENTIFICATION SCHEDULE

- A. Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment. Install access doors or panels to provide view of identifying devices.
- B. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, pull points, and locations of high visibility. Identify by system and circuit designation.
- C. Accessible Fittings for Raceways and Cables within Buildings: Identify the covers of each junction and pull box of the following systems with self-adhesive labels containing the wiring system legend and system voltage. System legends shall be as follows:
 - 1. "EMERGENCY POWER."
 - 2. "FIRE ALARM."
 - 3. "HIGH VOLTAGE."
 - 4. "DIRECT CURRENT."
- D. Control-Circuit Conductor Identification: For conductors and cables in pull and junction boxes, manholes, and handholes, use write-on tags with the conductor or cable designation, origin, and destination.
- E. Control-Circuit Conductor Termination Identification: For identification at terminations, provide self-adhesive wraparound labels with the conductor designation.
- F. Conductors to Be Extended in the Future: Attach write-on tags to conductors and list source.
- G. 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.
- H. Locations of Underground Lines: Underground-line warning tape for power, lighting, communication, and control wiring and optical-fiber cable.
- I. Workspace Indication: Apply floor marking tape to finished surfaces. Show working clearances in the direction of access to live parts. Workspace shall comply with NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.
- J. Instructional Signs: Self-adhesive labels, including the color code for grounded and ungrounded conductors.
- K. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Self-adhesive equipment labels.
 - 1. Apply to exterior of door, cover, or other access.
 - 2. For equipment with multiple power or control sources, apply to door or cover of equipment, including, but not limited to, the following:

- a. Power-transfer switches.
 - b. Controls with external control power connections.
- L. Arc Flash Warning Labeling: Self-adhesive labels.
- M. Operating Instruction Signs: Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.
- N. Emergency Operating Instruction Signs: Self-adhesive labels, Laminated acrylic or melamine plastic signs with white legend on a red background with minimum 3/8-inch- (10-mm-) high letters for emergency instructions at equipment used for power transfer and load shedding.
- O. Equipment Identification Labels:
- 1. Indoor Equipment: Engraved, laminated acrylic or melamine plastic label.
 - 2. Outdoor Equipment: Engraved, Laminated acrylic or melamine label.
 - 3. Equipment to Be Labeled:
 - a. Panelboards/Switchboards:
 - 1) Label shall be self-adhesive, engraved, laminated acrylic or melamine. Label shall include: Panelboard/switchboard name, voltage, amperage, number of phases and wires, source and available fault current with date calculated.
 - 2) Typewritten directory of circuits in the location provided by panelboard manufacturer. Spares shall be filled in by hand with pencil.
 - b. Enclosures and electrical cabinets.
 - c. Access doors and panels for concealed electrical items.
 - d. Transformers: Label that includes tag designation shown on Drawings for the transformer, feeder, and panelboards or equipment supplied by the secondary.
 - e. Emergency system boxes and enclosures.
 - f. Enclosed switches.
 - g. Enclosed circuit breakers.
 - h. Enclosed controllers.
 - i. Variable-speed controllers.
 - j. Push-button stations.
 - k. Power transfer equipment.
 - l. Contactors.
 - m. Remote-controlled switches, dimmer modules, and control devices.
 - n. Battery-inverter units.
 - o. Battery racks.
 - p. Power-generating units.
 - q. Monitoring and control equipment.
 - r. UPS equipment.
 - s. Wiring devices: See specification section "Wiring Devices".

END OF SECTION 260553

SECTION 262213 - LOW-VOLTAGE DISTRIBUTION TRANSFORMERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes distribution, dry-type transformers with a nominal primary and secondary rating of 600 V and less, with capacities up to 1500 kVA.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings:
 - 1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - 2. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment.
 - 3. Include diagrams for power, signal, and control wiring.

1.3 INFORMATIONAL SUBMITTALS

- A. Seismic Qualification Data: Certificates, for transformers, accessories, and components, from manufacturer.
- B. Source quality-control reports.
- C. Field quality-control reports.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

1.5 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with IEEE C57.12.91, "Test Code for Dry-Type Distribution and Power Transformers."

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Temporary Heating: Apply temporary heat according to manufacturer's written instructions within the enclosure of each ventilated-type unit, throughout periods during which equipment is not

energized and when transformer is not in a space that is continuously under normal control of temperature and humidity.

1.7 COORDINATION

- A. Coordinate size and location of concrete bases with actual transformer provided. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified with concrete.
- B. Coordinate installation of wall-mounting and structure-hanging supports with actual transformer provided.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. 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:
 - 1. Eaton.
 - 2. Square D; by Schneider Electric.
 - 3. General Electric Company.
 - 4. Tierney Electrical Manufacturing Co.

2.2 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Transformers shall withstand the effects of earthquake motions determined according to **ASCE/SEI 7**.
 - 1. The term "withstand" means "the transformer will remain in place without separation of any parts when subjected to the seismic forces specified and the transformer will be fully operational after the seismic event."

2.3 GENERAL TRANSFORMER REQUIREMENTS

- A. Description: Factory-assembled and -tested, air-cooled units for 60-Hz service.
- B. Comply with NFPA 70.
 - 1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
- C. Transformers Rated 15 kVA and Larger:
 - 1. Comply with 10 CFR 431 (DOE 2016) efficiency levels.
 - 2. Marked as compliant with DOE 2016 efficiency levels by an NRTL.
- D. Encapsulation: Transformers smaller than 30 kVA shall have core and coils completely resin encapsulated.

- E. Cores: Electrical grade, non-aging silicon steel with high permeability and low hysteresis losses.
- F. Coils: Continuous windings except for taps.
 - 1. Coil Material: Copper.
 - 2. Internal Coil Connections: Brazed or pressure type.
 - 3. Terminal Connections: Welded.
- G. Shipping Restraints: Paint or otherwise color-code bolts, wedges, blocks, and other restraints that are to be removed after installation and before energizing. Use fluorescent colors that are easily identifiable inside the transformer enclosure.

2.4 DISTRIBUTION TRANSFORMERS

- A. Comply with NFPA 70.
- B. Provide transformers that are constructed to withstand seismic forces specified in Section 260548.16 "Seismic Controls for Electrical Systems."
- C. Cores: One leg per phase.
- D. Indoor Enclosure: Ventilated.
 - 1. NEMA 250, Type 2: Core and coil shall be encapsulated within resin compound to seal out moisture and air.
 - 2. KVA Ratings: Based on convection cooling only and not relying on auxiliary fans.
 - 3. Wiring Compartment: Sized for conduit entry and wiring installation.
- E. Outdoor Enclosure: Ventilated.
 - 1. NEMA 250, Type 3R: Core and coil shall be encapsulated within resin compound, sealing out moisture and air.
 - 2. KVA Ratings: Based on convection cooling only and not relying on auxiliary fans.
 - 3. Wiring Compartment: Sized for conduit entry and wiring installation.
- F. Taps for Transformers 3 kVA and Smaller: One 5 percent tap above normal full capacity.
- G. Taps for Transformers 7.5 to 24 kVA: Two 5 percent taps below rated voltage.
- H. Taps for Transformers 25 kVA and Larger: Two 2.5 percent taps above and two 2.5 percent taps below normal full capacity.
- I. Insulation Class, Smaller than 30 kVA: 180 deg C, UL-component-recognized insulation system with a maximum of 115 deg C rise above 40 deg C ambient temperature.
- J. Insulation Class, 30 kVA and Larger: 220 deg C, UL-component-recognized insulation system with a maximum of 150 deg C rise above 40 deg C ambient temperature.
- K. Grounding: Provide ground-bar kit or a ground bar installed on the inside of the transformer enclosure.
- L. Wall Brackets: Manufacturer's standard brackets.

- M. Low-Sound-Level Requirements: Comply with NEMA ST 20 standard sound levels when factory tested according to IEEE C57.12.91.

IDENTIFICATION

- N. Nameplates: Engraved, laminated-acrylic or melamine plastic signs for each distribution transformer, mounted with corrosion-resistant screws. Nameplates and label products are specified in Section 260553 "Identification for Electrical Systems."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine conditions for compliance with enclosure- and ambient-temperature requirements for each transformer.
- B. Verify that field measurements are as needed to maintain working clearances required by NFPA 70 and manufacturer's written instructions.
- C. Examine walls, floors, roofs, and concrete bases for suitable mounting conditions where transformers will be installed.
- D. Verify that ground connections are in place and requirements in Section 260526 "Grounding and Bonding for Electrical Systems" have been met. Maximum ground resistance shall be 5 ohms at location of transformer.
- E. Environment: Enclosures shall be rated for the environment in which they are located. Covers for NEMA 250, Type 4X enclosures shall not cause accessibility problems.

3.2 INSTALLATION

- A. Install wall-mounted transformers level and plumb with wall brackets fabricated by transformer manufacturer.
 - 1. Coordinate installation of wall-mounted and structure-hanging supports with actual transformer provided.
- B. Install transformers level and plumb on a concrete base with vibration-dampening supports. Locate transformers away from corners and not parallel to adjacent wall surface.
- C. Construct concrete bases and anchor floor-mounted transformers according to manufacturer's written instructions, requirements in Section 260529 "Hangers and Supports for Electrical Systems" and Section 260548.16 "Seismic Controls for Electrical Systems."
 - 1. Coordinate size and location of concrete bases with actual transformer provided. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified with concrete.
- D. Secure transformer to concrete base according to manufacturer's written instructions.

- E. Secure covers to enclosure and tighten all bolts to manufacturer-recommended torques to reduce noise generation.
- F. Remove shipping bolts, blocking, and wedges.

3.3 CONNECTIONS

- A. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."
- B. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."
- C. 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-486B.
- D. Provide flexible connections at all conduit and conductor terminations and supports to eliminate sound and vibration transmission to the building structure.

3.4 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Small (Up to 167-kVA Single-Phase or 500-kVA Three-Phase) Dry-Type Transformer Field Tests:
 - 1. Visual and Mechanical Inspection.
 - a. Inspect physical and mechanical condition.
 - b. Inspect anchorage, alignment, and grounding.
 - c. Verify that resilient mounts are free and that any shipping brackets have been removed.
 - d. Verify the unit is clean.
 - e. Perform specific inspections and mechanical tests recommended by manufacturer.
 - 2. Electrical Tests:
 - a. Measure resistance at each winding, tap, and bolted connection.
 - b. Verify correct secondary voltage, phase-to-phase and phase-to-neutral, after energization and prior to loading.
- C. Remove and replace units that do not pass tests or inspections and retest as specified above.
- D. Test Labeling: On completion of satisfactory testing of each unit, attach a dated and signed "Satisfactory Test" label to tested component.

3.5 ADJUSTING

- A. Record transformer secondary voltage at each unit for at least 48 hours of typical occupancy period. Adjust transformer taps to provide optimum voltage conditions at secondary terminals. Optimum is defined as not exceeding nameplate voltage plus 10 percent and not being lower than nameplate voltage minus 3 percent at maximum load conditions. Submit recording and tap settings as test results.

- B. Output Settings Report: Prepare a written report recording output voltage and tap settings.

3.6 CLEANING

- A. Vacuum dirt and debris; do not use compressed air to assist in cleaning.

END OF SECTION 262213

SECTION 262416 - PANELBOARDS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Circuit breakers for installation in existing panelboards.

1.2 DEFINITIONS

- A. OCPD: Overcurrent protective device.
- B. MCCB: Molded-case circuit breaker.
- C. SPD: Surge protective device.
- D. NRTL: Nationally Recognized Testing Laboratory.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of overcurrent protective device, accessory, and component.
- B. Shop Drawings:
 - 1. Include dimensioned plans, elevations, sections, and details.
 - 2. Detail enclosure types including mounting and anchorage, environmental protection, knockouts, corner treatments, covers and doors, gaskets, hinges, and locks.
 - 3. Detail bus configuration, current, and voltage ratings.
 - 4. Short-circuit current rating of panelboards and all individual overcurrent protective devices.
 - 5. Current limitation curves and time-current coordination curves for each type and rating of overcurrent protective device.
 - 6. Time-current coordination curves for each type and rating of overcurrent protective device included in panelboards.
 - 7. Schematic and wiring diagrams for power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

- A. Panelboard schedules for installation in panelboards.
- B. Seismic Qualification Data: Certificates, for panelboards, overcurrent protective devices, accessories, and components, from manufacturer.
 - 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 - 3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.
 - 1. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.
 - 2. Field settings for all adjustable overcurrent protective devices.
- B. Record of performance testing for ground fault breakers in accordance with NEC 230.95(C).

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Workers qualified as defined in NEMA PB 1.1 and trained in electrical safety as required by NFPA 70E.

1.7 FIELD CONDITIONS

- A. Environmental Limitations:
 - 1. Do not deliver or install panelboards until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above panelboards is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
 - 2. Rate equipment for continuous operation under the following conditions unless otherwise indicated:
 - a. Ambient Temperature: Not exceeding 23 deg F (minus 5 deg C) to plus 104 deg F (plus 40 deg C).
 - b. Altitude not exceeding 6600 feet (2000 m).
- B. Service Conditions: NEMA PB 1.1, usual service conditions, as noted above.

1.8 COORDINATION

- A. Coordinate layout and installation of panelboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, ductwork, encumbrances to workspace clearance requirements and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels in accordance with NEC 110.26.

1.9 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace panelboards enclosures, buswork, overcurrent protective devices, accessories that fail in materials or workmanship within specified warranty period.
 - 1. Panelboard Warranty Period: 12 months from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Seismic Requirements: Fabricate and test panelboards according to IEEE 344 to withstand seismic forces defined in Section 260548.16 "Seismic Controls for Electrical Systems."
 - 1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

2.2 PANELBOARDS COMMON REQUIREMENTS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Square D by Schneider Electric.
 - 2. Eaton Cutler-Hammer.
 - 3. ABB/General Electric Company.
- B. Source Limitations: Obtain panelboards, overcurrent protective devices, components, and accessories from single source from single manufacturer.
- C. Product Selection for Restricted Space: Drawings indicate maximum dimensions for panelboards including clearances between panelboards and adjacent surfaces and other items. Comply with indicated maximum dimensions.
- D. Fabricate and test panelboards according to IEEE 344 to withstand seismic forces defined in Section 260548.16 "Seismic Controls for Electrical Systems."
- E. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- F. Comply with NEMA PB 1.
- G. Comply with NFPA 70.
- H. Enclosures: Flush and Surface-mounted (as noted on plans), dead-front cabinets.
 - 1. Rated for environmental conditions at installed location.
 - a. Indoor Dry and Clean Locations: NEMA 250, Type 1.
 - b. Outdoor Locations: NEMA 250, Type 3R.
 - c. Kitchen or Wash-Down Areas: NEMA 250, Type 4X, stainless steel.
 - d. Other Wet or Damp Indoor Locations: NEMA 250, Type 4.
 - e. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: NEMA 250, Type 12.
 - 2. Mounting Height:
 - a. Standard: 84 inches to top of enclosure (so that maximum height of highest breaker is 79 inches maximum).

3. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box. Trims shall cover all live parts and shall have no exposed hardware.
 4. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover. Trims shall cover all live parts and shall have no exposed hardware.
- I. Incoming Mains Location: Top or Bottom as determined by Contractor, based on field conditions, UNO.
 - J. Phase, Neutral, and Ground Buses: Hard-drawn copper (98 percent conductivity).
 - K. Conductor Connectors: Suitable for use with conductor material, quantity and sizes. Refer to the Feeder Schedule on the contract documents.
 1. Material: Hard-drawn copper (98 percent conductivity).
 2. Main and Neutral Lugs: Mechanical type, with a lug on the neutral bar for each pole in the panelboard.
 3. Ground Lugs and Bus - Configured Terminators: Mechanical type, with a lug on the bar for each pole in the panelboard.
 - L. NRTL Label: Panelboards shall be labeled by an NRTL acceptable to authority having jurisdiction for use as service equipment with one or more main service disconnecting and overcurrent protective devices.
 - M. Future Devices: Panelboards shall have mounting brackets, bus connections, filler plates, and necessary appurtenances required for future installation of devices.
 - N. Panelboard Short-Circuit Current Rating: Fully rated to interrupt symmetrical short-circuit current available at terminals. Assembly listed by an NRTL for 100 percent interrupting capacity.

2.3 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

- A. All OCPDs shall be fully rated for available fault current. No series rating will be allowed.
- B. Manufacturers – Breakers shall be manufactured by the same manufacturer as the panelboard in which they are installed.
- C. Branch Overcurrent Protective Devices - Bolt-on circuit breakers. Replaceable without disturbing adjacent units.

2.4 CIRCUIT BREAKERS

- A. General requirements
 1. Breakers shall meet current NEMA and UL specifications as applicable to frame size, standard rating and interrupting capability.
 2. Breakers shall be one-, two-, or three-pole as scheduled, operate manually for normal ON-OFF switching and automatically under overload and short circuit conditions.
 3. The operating handle shall open and close all poles simultaneously on multi-pole breakers. The operating mechanism shall be trip-free so that contacts cannot be held closed against abnormal overcurrent or short circuit conditions. Do not use single-pole circuit breakers with handle ties where multi-pole breakers are indicated on the panel schedule or where required for poly-phase loads.

4. Breakers shall be of the type noted on panel schedule (shunt-trip, GFCI, arc-fault, etc.) or as required by the equipment being provided.
 5. Breakers noted as GFI protected for equipment shall have a 30mA or greater trip.
 6. Breakers noted as GFI protected for personnel shall have a 6mA trip.
 7. A control transformer with primary and secondary fusing shall be provided as required for control of shunt-trip breakers.
- B. Molded-Case Circuit Breaker (MCCB): Comply with UL 489, with interrupting capacity to meet available fault currents.
1. Molded case circuit breakers shall be bolt-on type only and suitable for individual as well as panelboard mounting. No breakers designated "plug-on" type allowed unless specifically noted on plans.
 2. Thermal-Magnetic Circuit Breakers:
 - a. Inverse time-current element for low-level overloads.
 - b. Instantaneous magnetic trip element for short circuits.
 - c. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
 3. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
 4. Electronic trip circuit breakers with rms sensing; field-replaceable rating plug or field-replicable electronic trip; and the following field-adjustable settings (LSIG):
 - a. Instantaneous trip.
 - b. Long- and short-time pickup levels.
 - c. Long- and short-time adjustments.
 - d. Ground-fault pickup level, time delay, and I^2t response.
 5. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller; let-through ratings less than NEMA FU 1, RK-5.
 6. GFCI Circuit Breakers: Single- and double-pole configurations with Class A ground-fault protection (6-mA trip).
 7. GFEP Circuit Breakers: Class B ground-fault protection (30-mA trip).
 8. Arc-Fault Circuit Interrupter Circuit Breakers: Comply with UL 1699; 120/240-V, single-pole configuration.
 9. Sub-feed Circuit Breakers: Vertically mounted.
 10. MCCB Features and Accessories:
 - a. Standard frame sizes, trip ratings, and number of poles.
 - b. Breaker handle indicates tripped status.
 - c. UL listed for reverse connection without restrictive line or load ratings.
 - d. Lugs: Mechanical style, suitable for number, size, trip ratings, and conductor materials.
 - e. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and HID lighting circuits.
 - f. Ground-Fault Protection: Integrally mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator.
 - g. Handle Padlocking Device: Fixed attachment, for locking circuit-breaker handle in on or off position.

2.5 IDENTIFICATION

- A. Service Equipment Label: NRTL labeled for use as service equipment for switchboards (as applicable) with one or more service disconnecting and overcurrent protective devices.
- B. Breaker Labels - Faceplate shall list current rating, UL and IEC certification standards, and AIC rating.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Receive, inspect, handle, and store panelboards according to NEMA PB 1.1.
- B. Examine panelboards before installation. Reject panelboards that are damaged or rusted or have been subjected to water saturation.
- C. Examine elements and surfaces to receive panelboards for compliance with installation tolerances and other conditions affecting performance of the Work.
- D. Examine all OCPDs before installation. Reject any that are moisture damaged or physically damaged.
- E. Examine utilization equipment nameplates and installation instructions. Install OCPDs of sizes and with characteristics appropriate for each piece of equipment.
- F. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with NECA 1.
- B. Install panelboards and accessories according to NEMA PB 1.1.
- C. Comply with mounting and anchoring requirements specified in Section 260548.16 "Seismic Controls for Electrical Systems."
- D. Mount top of enclosure (standard panelboards or ADA dwelling unit panelboards) in accordance with mounting heights noted in paragraph 2.2 above.
- E. Mount panelboard cabinet plumb and rigid without distortion of box.
- F. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.
- G. Install filler plates in unused spaces.
- H. Install overcurrent protective devices and controllers not already factory installed.
 - 1. Set field-adjustable, circuit-breaker trip ranges.

- I. Make grounding connections and bond neutral for services and separately derived systems to ground. Make connections to grounding electrodes, separate grounds for isolated ground bars, and connections to separate ground bars.
- J. Ground fault breaker settings.
 - 1. Set GF Trip Pickup at 0.5 for all Main and Branch GF breakers, UNO.
 - 2. Set GF Trip Delay to 0.1 for the Main breaker and to 0 or OFF for all Branch GF breakers, UNO.
 - 3. Set GF Trip Slope to 0 for all Main and Branch GF breakers, UNO.
- K. Spare conduit stub-outs at recessed panels
 - 1. In the following paragraphs, accessible is defined as being arranged so that an appropriately dressed person, 6'-2" tall, weighing 250 pounds, may approach the area in question with tools and products necessary for the work intended, and may then position himself/herself to properly and safely perform the task to be accomplished, without disassembly or damage to the surrounding installation.
 - 2. All spare conduits shall be terminated in locations where they are accessible from a crawlspace, attic, or by ladder in areas that have t-grid ceilings. They shall be terminated away from equipment, ducts or pipes that would obstruct access.
 - 3. Stub four (4) 1-inch empty conduits from panelboard into accessible ceiling space above the panel, or a space designated to be ceiling space in the future.
 - 4. Where applicable, stub four (4) 1-inch empty conduits into accessible floor space or accessible ceiling space on the level below.
- L. Arrange conductors in gutters into groups and bundle and wrap with wire ties.
- M. Panelboards shall not be used as pull-boxes for any wiring that does not terminate in that panelboard.

3.3 IDENTIFICATION

- A. Identify field-installed conductors, interconnecting wiring, and components; install warning signs complying with requirements in Section 260553 "Identification for Electrical Systems."
- B. Circuit Directory: Directory card inside panelboard door, mounted in transparent card holder. Indicate installed circuit loads; incorporate Owner's final room designations. Obtain approval before installing. Handwritten directories are not acceptable. Install directory inside panelboard door.
- C. Panelboard Nameplates: Label each panelboard with a nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems." Include: Panel name, voltage, amperage, number of phases and wires, source and available fault current with date calculated.
- D. Device Nameplates: Label each branch circuit device in power panelboards with a nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."
- E. Install warning signs/labels complying with requirements in Section 260553 "Identification for Electrical Systems" identifying source of remote circuit.

- F. On main distribution panel door provide a laminated one-line diagram of the electrical system and all panel configurations.

3.4 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
 - 1. Acceptance:
 - a. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit. Open control and metering circuits within the panelboard, and remove neutral connection to surge protection and other electronic devices prior to insulation test. Reconnect after test.
 - b. Test continuity of each circuit.
 - 2. Test ground-fault protection of equipment for service equipment per NFPA 70.
 - 3. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
 - 4. Test and adjust controls, remote monitoring, and safeties. Replace any damaged and malfunctioning controls and equipment.
 - 5. Test and demonstrate proper function of all GFCI, AFCI and shunt-trip breakers.
- B. Panelboards will be considered defective if they do not pass tests and inspections.
- C. Prepare test and inspection reports, including a certified report that identifies panelboards included and that describes scanning results, with comparisons of the two scans. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.5 DEMONSTRATION

- A. Train Owner's maintenance personnel:
 - 1. To adjust, operate, and maintain panelboards, overcurrent protective devices, instrumentation, and accessories.
 - 2. How to set and reset arc fault reduction switches for maintenance.

END OF SECTION 262416

SECTION 262726 - WIRING DEVICES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Straight-blade convenience receptacles.
 2. GFCI receptacles.
 3. Toggle switches.
 4. Wall plates.
 5. Finishes.

1.2 DEFINITIONS

- A. Abbreviations of Manufacturers' Names:
1. Cooper: Copper Wiring Devices; Division of Cooper Industries, Inc.
 2. Hubbell: Hubbell Incorporated: Wiring Devices-Kellems.
 3. Leviton: Leviton Mfg. Company, Inc.
 4. P&S: Pass & Seymour/Legrand.

1.3 ACTION SUBMITTALS

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

1.4 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

PART 2 - PRODUCTS

2.1 GENERAL WIRING-DEVICE REQUIREMENTS

- A. Wiring Devices, Components, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with NFPA 70.
- C. Devices that are manufactured for use with modular plug-in connectors may be substituted under the following conditions:
1. Connectors shall comply with UL 2459 and shall be made with stranding building wire.
 2. Devices shall comply with the requirements in this Section.
- D. Devices for Owner-Furnished Equipment:

1. Receptacles: Match plug configurations including wire count, poles, twistlock, etc.
- E. Source Limitations: Obtain each type of wiring device and associated wall plate from single source from single manufacturer.

2.2 STRAIGHT-BLADE RECEPTACLES

- A. Duplex Convenience Receptacles, 125V, 20A: Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, and FS W-C-596.
 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Cooper; 5351 (single), 5362 (duplex), 5362CH (half-controlled duplex).
 - b. Hubbell; HBL5361 (single), HBL5362 (duplex), BR20C1 (half-controlled duplex).
 - c. Leviton; 5361 (single), 5362 (duplex), 5362-S1 (half-controlled duplex).
 - d. P&S; 5351 (single), CRB5362 (duplex), 5362CH (half-controlled duplex).
- B. Tamper-Resistant Convenience Receptacles, 125V, 20A: Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R UL 498, and FS W-C-596.
 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Cooper; TR5362 (duplex), TR5362CH (half-controlled duplex).
 - b. Hubbell; HBL5362TR (duplex), HBL5362C1TR (half-controlled duplex).
 - c. Leviton; 5362-SG (duplex), 5362-1P (half-controlled duplex)
 - d. P&S; TR5362 (duplex), TR5362CH (half-controlled duplex)

2.3 GFCI RECEPTACLES

- A. General Description:
 1. 125V, 20A, straight blade, non-feed-through type.
 2. Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, UL 943 Class A, and FS W-C-596.
 3. Include indicator light that shows when the GFCI has malfunctioned and no longer provides proper GFCI protection.
 4. Self-testing:
 - a. Automatic test initiates within 5 seconds of power availability to the line or load terminals and repeats at least every 3 hours.
 - b. If auto-monitoring detects a problem, GFCI will trip with the inability to reset.
- B. Duplex GFCI Convenience Receptacles, 125V, 20A:
 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Cooper; VGF20.
 - b. Hubbell; GFR5352L.
 - c. Leviton; GFNT2.
 - d. P&S; 2097.
- C. Tamper-Resistant, Duplex GFCI Convenience Receptacles, 125V, 20A:

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Cooper; TRVGF20.
 - b. Hubbell; GFRTRST20.
 - c. Leviton; GFTR2-KW.
 - d. P&S; 2097TR.

D. Weather Resistant, Self-Testing, Duplex GFCI Receptacles, 125V, 20A:

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Cooper; WRSGF20.
 - b. Hubbell; GFTWRST20.
 - c. Leviton; GFWR2.
 - d. P&S; 2097TRWR.
2. For use only with wet or damp location covers.

2.4 TOGGLE SWITCHES

A. Comply with NEMA WD 1, UL 20, and FS W-S-896.

B. Switches, 120/277V, 20A:

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Single Pole:
 - 1) Cooper; AH1221.
 - 2) Hubbell; HBL1221.
 - 3) Leviton; 1221-2.
 - 4) P&S; CSB20AC1.
 - b. Two Pole:
 - 1) Cooper; AH1222.
 - 2) Hubbell; HBL1222.
 - 3) Leviton; 1222-2.
 - 4) P&S; CSB20AC2.
 - c. Three Way:
 - 1) Cooper; AH1223.
 - 2) Hubbell; HBL1223.
 - 3) Leviton; 1223-2.
 - 4) P&S; CSB20AC3.
 - d. Four Way:
 - 1) Cooper; AH1224.
 - 2) Hubbell; HBL1224.
 - 3) Leviton; 1224-2.
 - 4) P&S; CSB20AC4.

C. Lit-Handle Switches, 20A:

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Cooper; AH1221LT.
 - b. Hubbell; HBL1201IL.
 - c. Leviton; 1221-LH1.

- d. P&S; PS20AC1-CSL.
2. Description: Single pole, with lighted handle, illuminated when switch is "off".
- D. Pilot-Light Switches, 20A:
 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Cooper; AH1221PL (single-pole), AH1222PL (two-pole).
 - b. Hubbell; HBL1221PL (single-pole), HBL1222PL (two-pole).
 - c. Leviton; 1221-PLR (single-pole), 1222-PLR (two-pole).
 - d. P&S; PS20AC1-RPL (single-pole), PS20AC2-RPL (two-pole).
 2. Description: Single pole or two-pole, with lighted handle, illuminated when switch is "on."
- E. Key-Operated Switches, 120/277V, 20A:
 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Single Pole:
 - 1) Cooper; AH1221L.
 - 2) Hubbell; HBL1221L.
 - 3) Leviton; 1121-2L.
 - 4) P&S; PS20AC1L.
 - b. Two Pole:
 - 1) Cooper; AH1222L.
 - 2) Hubbell; HBL1222L.
 - 3) Leviton; 1122-2L.
 - 4) P&S; PS20AC2L.
 - c. Three Way:
 - 1) Cooper; AH1223L.
 - 2) Hubbell; HBL1223L.
 - 3) Leviton; 1123-2L.
 - 4) P&S; PS20AC3L.
 - d. Four Way:
 - 1) Cooper; AH1224L.
 - 2) Hubbell; HBL1224L.
 - 3) Leviton; 1124-2L.
 - 4) P&S; PS20AC4L.
 2. Description: Single pole, with factory-supplied key in lieu of switch handle.
- F. Single-Pole, Double-Throw, Momentary-Contact, Center-off Switches: 120/277V, 15A; for use with mechanically held lighting contactors.
 - a. Cooper; 1995, 1995L (keyed).
 - b. Hubbell; HBL1557, HBL1557L (keyed)
 - c. Leviton; 1257-W, 1257-L (keyed).
 - d. Pass & Seymour; 1251, 1251L (keyed).

2.5 WALL PLATES

- A. Single and combination types shall match corresponding wiring devices.
 1. Plate-Securing Screws: Metal with head color to match plate finish.

2. Material for Finished Spaces: Match existing adjacent wall plate type for new devices being installed in existing spaces. Smooth, high-impact thermoplastic, or 0.035-inch- (1-mm-) thick, satin-finished, Type 302 stainless steel. Field verify and match.
3. Material for Unfinished Spaces: Galvanized steel.
4. Material for Damp Locations: Cast aluminum with spring-loaded lift cover, and listed and labeled for use in wet and damp locations.

B. Damp/Wet Location Covers

1. General:
 - a. All wiring devices installed in damp or wet locations shall have cast metal covers.
 - b. Covers shall be UL listed and labeled for use in wet and damp locations.
 - c. Distinction between damp and wet locations shall be in accordance with NEC 406.9.
 - d. Cover shall be appropriate for the device orientation with the hinge on top.
 - e. Gasketing shall be provided to seal the cover to the box. Caulking shall be provided as required to seal any gaps between the cover and wall finish material.
2. Damp Location Covers:
 - a. Cast metal with spring-loaded lift cover to seal the device when it is NOT in use.
 - b. Leviton Series 6196 or equivalent.
3. Wet Location (Weatherproof-in-Use) Covers:
 - a. Heavy Duty, Lockable, cast metal cover to seal the device whether it is in use or not.
 - b. Intermatic Series WP1010MXD or equivalent.

2.6 FINISHES

A. Device Color:

1. Wiring Devices Connected to Normal Power System: Match color of existing adjacent devices for new devices being installed in existing spaces, unless otherwise indicated or required by NFPA 70 or device listing.
2. Wiring Devices Connected to Emergency Power System: Red.

B. Wall Plate Color: For thermoplastic covers, match device color, unless noted otherwise.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with NECA 1, including mounting heights listed in that standard, unless otherwise indicated.
- B. Coordination with Other Trades:
 1. Protect installed devices and their boxes. 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 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.
5. Coordinate receptacle configuration, location and mounting height with equipment/ function it serves.

C. Conductors:

1. Do not strip insulation from conductors until right 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. Pigtailling existing conductors is permitted, provided the outlet box is large enough.

D. Device Installation:

1. Replace devices that have been in temporary use during construction and that were installed before building finishing operations were complete.
2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
4. Connect devices to branch circuits using pigtails that are not less than 6 inches (152 mm) in length.
5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, two-thirds to three-fourths of the way around terminal screw.
6. Use a torque screwdriver when a torque is recommended or required by manufacturer.
7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
8. Tighten unused terminal screws on the device.
9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device-mounting screws in yokes, allowing metal-to-metal contact.
10. Damp Location Covers: Not permitted UNO.
11. Wet Location Covers: Install everywhere outside UNO.

E. 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.

F. 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.

G. GFCI Receptacles: Install non-feed-through-type GFCI receptacles.

3.2 FIELD QUALITY CONTROL

A. Test Instruments: Use instruments that comply with UL 1436.

- B. Test Instrument for Convenience Receptacles: Digital wiring analyzer with digital readout or illuminated digital-display indicators of measurement.
- C. Perform the following tests and inspections:
 - 1. Tests for Convenience Receptacles:
 - a. Line Voltage: Acceptable range is 105 to 132V.
 - b. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is unacceptable.
 - c. Ground Impedance: Values of up to 2 ohms are acceptable.
 - d. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
 - e. Using the test plug, verify that the device and its outlet box are securely mounted.
 - f. Tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new ones, and retest as specified above.
- D. Wiring device will be considered defective if it does not pass tests and inspections.

3.3 IDENTIFICATION

- A. Receptacles: Identify panelboard and circuit number from which the device is served.
 - 1. Mark inside of box or coverplate with permanent marker. Test to ensure that marker lines are not visible on outside of cover when it is installed.
 - 2. Mark outside of coverplate using labeler such as Brother PT-90 to produce 1/8" black letters (white letters if cover is dark) on clear tape.

3.4 WEATHER STRIPPING

- A. Behind exterior wall devices
 - 1. Install a precut foam insulation pad over the fixture and reinstall the cover.

END OF SECTION 262726