

ALL TRADES SPECIFICATIONS

WARREN WOODS PUBLIC SCHOOLS
PROJECT NUMBER: 242030
DATE: MARCH 11, 2025

PROJECT

WARREN WOODS PUBLIC SCHOOLS

TOWER HIGH SCHOOL TITAN EXPRESS SERVERY HAWTHORN FOOD PROGRAM FREEZER REPLACEMENT

OWNER

Warren Woods Public Schools
12900 Frazho Road
Warren, MI 48088

ARCHITECT

Wakely Associates, Inc.
30500 Van Dyke Ave., Suite 209
Warren, Michigan 48093

SPECIFICATIONS

PROJECT NUMBER 242030
MARCH 11, 2025

PROJECT

WARREN WOODS PUBLIC SCHOOLS
TOWER HIGH SCHOOL
TITAN EXPRESS SERVERY
HAWTHORN FOOD PROGRAM
FREEZER REPLACEMENT

OWNER

WARREN WOODS PUBLIC SCHOOLS
12900 FRAZHO
WARREN, MI 48088

ARCHITECT

WAKELY ASSOCIATES, INC.
30500 VAN DYKE, SUITE 209
WARREN, MICHIGAN 48093
586-573-4100

MECHANICAL/ELECTRICAL

UNIFIED BUSINESS SYSTEMS ENGINEERING, LLC
75 N. MAIN STREET, SUITE 221
MT. CLEMENS, MI 48043
586-500-7055

WARREN WOODS PUBLIC SCHOOLS
 TOWER HS-TITAN EXPRESS SERVERY
 HAWTHORN FOOD PROGRAM
 FREEZER REPLACEMENT

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SECTION 00020 - INVITATION FOR BIDS

PROJECT

**WARREN WOODS PUBLIC SCHOOLS
TOWER HIGH SCHOOL-TITAN EXPRESS SERVERY
HAWTHORN FOOD PROGRAM
FREEZER REPLACEMENT**

OWNER

WARREN WOODS PUBLIC SCHOOLS
12900 FRAZHO ROAD
WARREN, MI 48088

ARCHITECT

WAKELY ASSOCIATES, INC.
30500 VAN DYKE AVENUE SUITE 209
WARREN, MICHIGAN 48093
(586) 573-4100

PROJECT DESCRIPTION:

The project consists of, but is not limited to:

Tower High School Titan Express

Renovation of the existing Titan Express server including but not limited to reconfiguration of serving lines, masonry wall relocation and infill, removal of; overhead counter doors, man doors, ceilings, floors, finishes etc. with new porcelain ceramic finishes on walls, floors, new overhead counter door, new food service equipment, new plumbing, electrical, with relocation of existing vending machines.

Hawthorn Food Service Freezer/Cooler

Removal of a freezer/cooler system including removal of the insulated floor/concrete slabs and installation of a new freezer/cooler with new insulated floor slab (Note: additional insulation is required with some additional excavation)

NOTE: This project is subject to the State of Michigan Prevailing Wages and Bids should include this.

ALLOWANCE:

Contractor shall include in Base Bid, an allowance of \$30,000.00 (Thirty Thousand dollars) for hidden unknown conditions. Any unused allowance money will be returned to the Owner at completion of the project.

TYPE OF PROPOSAL:

A single lump sum proposal is being entertained for the work of this proposal.

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DATE OF SUBMISSION:

The Owner will receive sealed proposals for the work herein set forth until **11:00 a.m. EDT, on Thursday, March 27, 2025 at Warren Woods Public Schools in the Hawthorn Administrative Services Building, 12900 Frazho Road, Warren, MI 48088.** Bids will be publicly opened shortly thereafter. Late bids will not be accepted or considered.

The bid shall be accompanied by a sworn and notarized statement disclosing any familial relationship that exists between the Owner or any employee of the bidder and any member of the School Board, or the Superintendent of Schools. The Owner will not accept a bid that does not include this sworn and notarized disclosure statement.

PROPOSAL GUARANTY:

Each proposal must be accompanied by a certified check, cashiers check, or a satisfactory Surety Bid Bond in an amount not less than five percent (5%) of the total bid price as guaranty. No bid shall be considered unless it is accompanied by the required guaranty.

Checks shall be made payable to Warren Woods Public Schools.

Such cash, checks, or bid bonds will be returned to all except the three lowest bidders for each contract within (5) five days after the opening of bids, and the remaining cash, checks, or bid bonds will be returned promptly after the Owner and the accepted bidders have executed the Contract, or if no award has been made, within (60) sixty days after the date of the opening of bids, upon demand of the bidder at any time thereafter, so long as they have not been notified of the acceptance of his bid.

PRE-BID MEETING

A Pre-Bid Meeting will be held at Warren Woods Tower High School, 27900 Bunert Road, Warren, MI 48088 **at 3:00 p.m. EDT on Wednesday, March 19, 2025.** Attendance at this pre-bid meeting is not mandatory, however, absolutely no extra cost will be allowed for any item or thing which could have been seen by visiting the site.

BIDDING DOCUMENTS:

Bidding documents consist of plans and specifications as prepared by Wakely Associates Inc./Architects, Warren, Michigan.

Bid documents can be purchased at the offices of ARC, 1009 W. Maple Road, Clawson, MI 48107 after noon on March 11, 2025.

Bidding documents will be available on or after noon on March 11, 2025 by calling Wakely Associates Inc. at 586-573-4100 or email at aduda@wakelyaia.com for a link to access the documents.

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Copies of the Bidding documents will also be on file for reference at the office of:

1. The Owner
2. CAM, Bloomfield Hills
3. McGraw Hill, Detroit
4. Reed Construction Data, Novi
5. The Architect

PROPOSAL ACCEPTANCE:

The right to accept and/or reject any and all proposals and to waive any and all informalities and/or irregularities in bid proposals submitted during the bidding process is reserved by the Owner, which right may be exercised at the sole discretion of the Owner.

PROPOSAL WITHDRAWAL:

Proposals for base bids may not be withdrawn for a period of (60) sixty days after the time established for the receipt of proposals. Bidders may withdraw at any item prior to the time set for the receipt of proposals.

END OF SECTION 00020

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SECTION 00100 - INSTRUCTIONS TO BIDDERS

Owner will receive sealed proposals only as set forth in the Invitation to Bid and complying with all requirements as contained in Instructions to Bidders.

DOCUMENTS

Bidding documents consist of plans and specifications as prepared by Wakely Associates Inc./Architects, Warren, Michigan.

Bid documents can be purchased at the offices of ARC, 1009 W. Maple Road, Clawson, MI 48107 beginning after noon on March 11, 2025.

Bidding documents will be available on or after noon on March 11, 2025 by calling Wakely Associates Inc. at 586-573-4100 or email at aduda@wakelyaia.com for a link to access the documents.

Copies of the Bidding documents will also be on file for reference at the office of:

1. The Owner
2. CAM, Bloomfield Hills
3. McGraw Hill, Detroit
4. Reed Construction Data, Novi
5. The Architect

BIDDING DOCUMENTS

The Bidding Documents consist of the following:

The Drawings as enumerated in Section 00851, Index of Drawings.

The Specifications as enumerated in the Table of Contents.

All other documents as provided for in Article 1, Paragraph 1, Section 1 of the General Conditions as modified.

EXAMINATION

Each bidder shall examine the Bidding Documents and satisfy themselves about the extent of the proposed work by personal examinations of the site and surroundings, and make their own estimate therefrom of the facilities and difficulties attending the performance and completion of the job.

No additional compensation will be allowed on account of conditions which could be determined by examining the Bidding Documents or the site.

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INTERPRETATION

If any person contemplating submitting a bid is in doubt as to the true meaning of any part of the Drawings, Specifications, or other Bidding Documents, they must submit to the Architect a written request for an interpretation thereof. If such an interpretation is not requested, the bids will be presumed to be based upon the interpretation and directions given by the Architect after Contract award, in accordance with provisions of the Contract.

Neither the Owner nor the Architect will be responsible for any verbal explanations or interpretations of the Bidding Documents.

Every request for such interpretation should be in writing, addressed to the Architect at his office, and to be given consideration, must be received at least (7) seven days prior to the date fixed for the opening of bids. Any and all such interpretations, and any supplemental instructions will be in the form of written addenda to the Bidding Documents which, if issued, will be mailed to all prospective bidders (at the respective address furnished for such purposes) prior to the date fixed for the opening of bids. All addenda so issued shall become part of the Bidding Documents.

SUBSTITUTIONS

To obtain approval to use unspecified products, bidders shall submit written requests at least (7) seven work days before the bid date. Requests received after this time will not be considered. Requests shall clearly describe the product for which approval is asked, including all data necessary to demonstrate acceptability. If the product is acceptable, the Architect will approve it in an Addendum issued to all prime bidders on record.

BASIS OF BID

A single lump sum proposal is being entertained for the complete work of this proposal.

Partial or segregated bids or assignments will not be considered. Include quotes for all alternates and unit prices; failure to do so may result in rejection of the proposal.

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PREPARATION

Proposal shall be submitted on the form bound in these specifications, Form of Proposal, in original form without erasures, interlineations or alterations.

Submit (2) two copies of proposal, retain one for your records. Oral, fax, email, or telephone proposals will not be accepted.

Proposals must be filled out in ink or typewritten in duplicate. Blank spaces in the proposals must be filled in and no changes shall be made to the phraseology of the proposal. Quotes shall be entered in verbal and numeric forms. In case of a discrepancy between the written and the numeric form, the written form shall govern.

All bids shall be signed and dated in longhand.

Bids which are not signed by the individual making them should have attached thereto a power of attorney, evidencing authority to act as agent for the person whom it is signed.

Bids which are signed for a partnership should be signed by one of the partners or by an attorney-in-fact. If signed by an attorney-in-fact, evidence of authority to sign the bids shall be attached.

Bids which are signed for a corporation should have the correct corporate name thereon and the signature of the president or other officer legally able to contract in the name of the corporations. In addition, a signed Secretary's Certificate evidencing the authority of the Officer to contract in the name of the corporation shall be included. Any proposal submitted by a corporation shall bear its seal.

BID SECURITY

The successful bidders securities will be retained until they have signed the Contract and furnished the required payment and performance bonds. The Owner reserves the right to retain the security of the next (2) two lowest bidders for each contract until the lowest bidders enter into contract, or until (60) sixty days after the bid opening, whichever is the shorter. All other bid security will be returned as soon as practicable. If any bidder refuses to enter into a Contract, the Owner will retain his Bid Security as liquidated damages, but not as a penalty.

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SUBCONTRACTORS

The Owner and Architect reserve the right to require of bidders tentatively selected for consideration in the awarding of the Contract, a list of the subcontractors whom the Contractor intends to employ.

The Owner reserves the right to disapprove the use of any proposed subcontractor, and in such event, the bidder submitting such subcontractor shall submit another such subcontractor in like manner within the time specified by the Owner. The Owner reserves the right to reject any bid if such information required by the Owner is not submitted as above indicated.

SUBMITTAL

Submit proposals in sealed opaque envelopes having listed thereon the following:

**PROPOSAL: WARREN WOODS PUBLIC SCHOOLS
TOWER HIGH SCHOOL-TITAN EXPRESS SERVERY
HAWTHORN FOOD PROGRAM
FREEZER REPLACEMENT
ATTN: NEIL CASSABON, DEPUTY SUPT., BUSINESS
SERVICES**

Contractor: _____

WITHDRAWAL

Proposals for base bids may not be withdrawn for a period of (60) sixty days after the time established for the receiving of proposals. Bidders may withdraw at any time prior to the time set for the receiving of proposals.

IRREGULARITIES

The Owner reserves the right to disqualify Bids before or after opening, upon evidence of collusion with intent to defraud, or other illegal practices upon the part of the bidder.

The Owner also reserves the right to reject any or all bids in whole or in part and to waive any informalities therein.

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Any error and/or omission in the proposal form or any other irregularity as a result of negligent preparation shall not furnish cause for relief for any damages resulting therefrom, nor in any way relieve the Contractor from fulfillment of all contractual obligations as provided for in the Bidding Documents.

TAXES AND CONTRIBUTIONS

Proposal, any unit prices, or any alternate prices stated include all taxes or contributions required by bidders business.

Michigan State sales tax is applicable to this work.

OPENING

Proposals will be publicly opened and read aloud.

BID BREAKDOWN CONSTRUCTION INFORMATION

Upon notice from the Architect, the low bidders shall submit a detailed cost breakdown of all work covered by the Bidding Documents. The breakdown shall show quantity of material and labor, units of material and labor, material cost, labor cost and total cost.

AWARD OF CONTRACT

The Contract will be awarded to the lowest responsible bids, complying with the terms of the Bidding Documents, with full consideration of alternates.

EXECUTION OF CONTRACT

The Owner reserves the right to accept any and all bids, or to negotiate contract terms with the various bidders when such is deemed by the Owner to be in his best interest.

END OF SECTION 00100

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NON-COLLUSION AFFIDAVIT

County)
) SS:

_____ being first duly sworn,
deposes and says that he is the

(Individual, Partner, Corporate Officer)

making the foregoing proposals or bids; that such bids are genuine and not collusive or sham; such bidder has not colluded, conspired, connived, or agreed, directly or indirectly, with any bidder or person, to put in sham a bid, or that such other person shall refrain from bidding and has not in any manner, directly with any person, to fix the bid price of afferent or any other bidder, or to fix any overhead, profit or cost element of said bid price, or of that of any other bidder, or to secure any advantage against the Joint Purchasers or any person or persons proposal are true; and further, that such bidder has not, directly or indirectly submitted this bid, or the contents thereof, or divulged information or data relative thereto any association or to any member or to any member or agent thereof.

Sworn to and subscribed before me this _____ day of _____, 20_____.

Notary Public

My commission expires on _____

BIDDER: THIS AFFIDAVIT MUST BE COMPLETED, SIGNED, NOTARIZED AND INCLUDED IN YOUR BID SUBMISSION.

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WORK REFERENCES

BIDDER'S COMPANY NAME _____

Please list at least three (3) companies or public agencies for which you have done similar work.

Macomb County reserves the right to reject low bids for poor past performance or inadequate references.

NAME OF COMPANY

CONTACT PERSON

ADDRESS

TELEPHONE NO.

NAME OF COMPANY

CONTACT PERSON

ADDRESS

TELEPHONE NO.

NAME OF COMPANY

CONTACT PERSON

ADDRESS

TELEPHONE NO.

NAME OF COMPANY

CONTACT PERSON

ADDRESS

TELEPHONE NO.

NAME OF COMPANY

CONTACT PERSON

ADDRESS

TELEPHONE NO.

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SECTION 00311 - PROPOSAL FORM/ALL TRADES

Name of Contractor

Address, City, Zip

Phone # / Fax #

Email Address

PROJECT

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OWNER

WARREN WOODS PUBLIC SCHOOLS
12900 FRAZHO ROAD
WARREN, MI 48088

ARCHITECT

WAKELY ASSOCIATES, INC.
30500 VAN DYKE AVENUE - SUITE 209
WARREN, MI 48093

BASE PROPOSAL

Pursuant to and in compliance with the Invitation to Bid and the Instructions to Bidders, and having carefully examined the Bidding Documents and all Addenda, the undersigned agrees to enter into an agreement with the Owner to complete the work in accordance with the said Bidding Documents for the sum of:

(Sum to be written out)

_____ Dollars \$ _____

Cost of bond (if bid is less than \$50,000: if bid is \$50,000 or higher, bond cost is to be included in bid)

_____ Dollars \$ _____

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The undersigned acknowledges he/she has included the sum of Thirty Thousand dollars (\$30,000.00) in the Base Bid for use of an allowance for hidden unknown conditions. Any unused allowance money will be returned to the Owner at completion of the project.

VOLUNTARY ALTERNATES

The following voluntary alternates are offered by the bidder. The undersigned agrees that the amounts indicated below shall be added to or deducted from the Base Bid, as the case may be, for each alternate which is accepted.

| <u>Description of Voluntary Alternates</u> | <u>Add</u> | <u>Deduct</u> |
|--|------------|---------------|
| 1. _____ | _____ | _____ |
| 2. _____ | _____ | _____ |
| 3. _____ | _____ | _____ |
| 4. _____ | _____ | _____ |

PRICE GUARANTEE

The undersigned proposes that the price stated in this Proposal is guaranteed for (60) sixty consecutive days from bid date.

TAXES

The undersigned acknowledges that the price stated above includes all taxes of whatever character or description.

SUPPLEMENTAL FEES

For additional work performed upon instruction of the Owner by subcontractors of the undersigned, add to the subcontractor's prices for such additional work a fee of _____% which includes all the charges of the undersigned for overhead and profit.

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Any additional work performed upon instructions of the Owner by persons other than the subcontractors of the undersigned, the charges will be actual cost of all labor and materials (less all discounts) plus the fee of _____% which includes all the charges of the undersigned for overhead and profit and to which shall be added the actual cost of insurance and taxes.

Each proposal covering extra work shall be accompanied with complete itemized material and labor breakdowns.

For all revisions involving the deletion of contract work, it is agreed that full credit shall be given the Owner for such work deleted, including overhead and profit as quoted hereinbefore.

TIME OF COMPLETION

The undersigned agrees to commence work operations immediately upon the last day of School (June 13, 2025), with substantial completion of the work by August 22, 2025, and that the proposed bid is in full consideration of this.

ADDENDA

If any addenda or bulletins covering changes to the Bidding Documents have been received during the bidding period, the bidder shall fill in their numbers and dates which acknowledges having received same, and having included in this Proposal the work involved:

_____ Dated _____

_____ Dated _____

_____ Dated _____

BID SECURITY

A bid bond executed by a U.S. Treasury Listed Surety Company acceptable to Warren Woods Public Schools or a cashier's check in the amount of at least 5% of the sum of the proposal payable to Warren Woods Public Union Schools shall be submitted with each proposal in excess of \$30,512. All proposals shall be firm for a period of sixty (60) days.

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PERFORMANCE AND LABOR BOND

Successful bidders whose proposals are \$50,000 or more will be required to furnish a U.S. Treasury Listed Company Performance and Payment Bond in the amount of 100% of their bid. The cost of the Bond shall be included in each proposal.

Bidders are to indicate cost of bond on the Bid Form if total bid is less than \$50,000. Owner will make a decision if bond is required on all bids less than \$50,000.

The Board of Education reserves the right to reject any and/or all bids in whole or in part and to waive any informality therein. The Board of Education reserves the right to accept that bid which in its opinion, is in the best interest of the Owner.

FAMILIAL DISCLOSURE/IRAN SANCTIONS/CRIMINAL BACKGROUND

Bidder has included Sections 00401 Familial Disclosure Form, the Section 00401A Iran Economic Sanctions Act Form., and 00401B Criminal Background Check (bid will not be read without these forms).

NEGOTIATION

The undersigned agrees that, should the overall cost exceed the funds available, he will be willing to negotiate with the Owner and Architect for the purpose of making further reductions in the Contract work, and shall agree to give full credit for all such reductions in the work requested by the Owner, including full value of labor, materials, and subcontract work and reasonable proportionate reductions in overhead and profit, thereby arriving at an agreed upon Contract price.

WARREN WOODS PUBLIC SCHOOLS
TOWER HS-TITAN EXPRESS SERVERY
HAWTHORN FOOD PROGRAM
FREEZER REPLACEMENT

242030

MARCH 11, 2025

CONTRACT EXECUTION

The undersigned agrees to execute a Contract for work covered by this Proposal, provided that he be notified of its acceptance within (60) sixty days after the opening of bids.

The undersigned hereby declares that he has the legal status checked below:

() Individual

() Partnership having the following partners:

() Corporation incorporated under the State laws of:

This proposal is submitted in the name of, and notice of acceptance should be mailed, faxed, or delivered to:

Date:

Firm's Name:

Phone No. ()

By:

(Signature)

In the presence of:

Title:

END OF SECTION 00311

WARREN WOODS PUBLIC SCHOOLS
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AFFIDAVIT OF COMPLIANCE – CRIMINAL BACKGROUND CHECKS
Michigan Public Act No. 517 of 2012

The undersigned, the owner or authorized officer of the below-named contractor (the “Contractor”), pursuant to the criminal background compliance certification requirements of Warren Woods Public Schools’ (the “School District”) hereby represents and warrants that the Contractor has performed and/or will perform sufficient criminal background checks, including at a minimum, an Internet Criminal History Tool (“ICHAT”) check, for all of its owners, employees, agents, representatives, contractors and/or other personnel who will be on any School District premises to carry out the services contemplated by the Contract Documents. The Contractor further hereby certifies that no owner, employee, agent, representative, contractor and/or other personnel of the Contractor will be on any School District premises if they are a registered criminal sexual offender under the Sex Offenders Registration Act, Public Act 295 of 1994, or have been convicted of “Listed Offense” as defined under Section 722 of the Sex Offenders Registration Act, MCL 28.722.

The Contractor further acknowledges that if it is found to have submitted a false certification or otherwise fails to comply with the requirements of this certification, the School District may immediately terminate the Contract.

CONTRACTOR:

(Name of Contractor)

By: _____

Its: _____

Date: _____

STATE OF _____)
)ss.
COUNTY OF _____)

The instrument was acknowledged before me on the _____ day of _____, 2025, by _____
_____.

, Notary Public

_____ County, _____

My Commission Expires: _____
Acting in the County of: _____

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SECTION 00710 - GENERAL CONDITIONS

DOCUMENTS:

"The General Conditions of the Contract for the Construction"
A.I.A. Documents A-201, 2017 Edition, Forms a part of these
Specifications and shall have the same effect as if bound herein.

This Document is modified as described in Modifications of the
General Conditions.

Contractors shall be held responsible for having familiarized
themselves with this Document and all other documents affecting
their contracts in this Specification.

END OF SECTION 00710

SECTION 00810 - MODIFICATIONS OF THE GENERAL CONDITIONS

Where any Article of the American Institute of Architects General Conditions, (AIA Document A201, 2017 Edition) is supplemented by the following provisions of such Article shall remain in effect and all supplementary provisions shall be considered as added thereto. Where any such article is modified, superseded or deleted herein, provisions of such articles not so specifically modified, superseded or deleted shall remain in effect.

Article 1 - General Provisions

1.1.1 The Contract Documents. Modification: first sentence:
"The Contract Documents consist of the entire Bidding Documents package and the Agreement...."

Deletion: last sentence.

Addition: new text as follows (sub-subparagraph to 1.1.1):

1.1.1.1 As used in the Contract Documents, the following terms are defined as indicated below:

OWNER - as defined in Advertisement or Invitation to Bid. ARCHITECT/ENGINEER - the firm of Wakely Associates Inc.

CONTRACTOR - the person or entity so named in the Agreement who shall be known as the "prime contractor" in addition to references in Article 3.

SUPPLIER - such person or entity that supplies materials or the work to the Contractor or to a subcontractor but performs no work at the site.

N.I.C. - not in contract, work not included in this Contract.

OCCURRENCE: is defined as follows for purposes of insurance. An event which occurs during the policy period, or a continuous or repeated exposure to condition(s) which result, during the policy period, in bodily injury, sickness, or disease, or injury to, or destruction of property, of one or more persons or organizations, including the loss of use thereof,

resulting from a common cause, or from exposure to substantially the same general condition existing at, or emanating from each location shall be deemed to result from one occurrence.

Addition: new text as follows (sub-subparagraph to 1.1.3):

- 1.1.3.1 The Contractor is responsible for coordinating and allocating the work of all trades on the project at the time of bidding as well as during the Construction in regards to the providing of labor and materials, and performance of all cutting, coring, patching and repair work necessary to complete the project as required by the various trades including the proper allocation of work to the proper trade as claimed by the trade unions having jurisdiction over such work. Whether the Contractor's own forces perform such work or he allocates it to various subcontractors or trades, the contractor is responsible for such work and the complete project.
- 1.1.3.2 The Contractor shall interface all Contract work with no duplication of cost incurred due to the allocation of same work to more than one trade, and with no omissions of costs of any work due to such work not being properly assigned or allocated to a specific subcontractor, trade or the Contractor.

Addition: new paragraphs as follows:

- 1.2.4 The Drawings show the general arrangement, design and extent of the Work and are partially diagrammatic. The Drawings shall not be scaled for rough-in measurements, nor serve as Shop Drawings.
- 1.2.5 RELATION OF SPECIFICATIONS AND DRAWINGS:
- 1 To be equal authority and priority. Should they disagree in themselves, or with each other, bids shall be based on the most expensive combination of quality and quantity of work indicated. The appropriate Work, in the event of the above mentioned disagreements, shall be determined by the Architect.
 - 2 Figures take precedence over scale measurements.

- 3 Large scale details take precedence over smaller scale details.
 - 4 Architectural Drawings take precedence in regard to dimensions, when in conflict with Mechanical and Structural Drawings, except for the size of the structural members.
 - 5 Specifically titled drawings and sections of the specifications take precedence over indication of the item in a collateral way.
 - 6 Existing conditions take precedence over Drawings and Specifications for dimensions.
 - 7 When multiple requirements are given for any item, all requirements shall be met.
- 1.2.6 CODE, LAWS, ORDINANCES, RULES, and REGULATIONS: Requirements of public authorities apply as minimum requirements only. They do not supersede more stringent requirements given elsewhere in the Contract Documents. If changes must be made to the Contract because of public authorities, appropriate adjustments will be made in the Contract Sum.
- 1.2.7 ENUMERATION OF ITEMS: Lists of "Work Included", "Scope" or "Description of Work" are not intended to enumerate each and every item of work or appurtenance required, and must be used in conjunction with other portions of the Contract Documents.
- 1.2.8 SPECIFIED MATERIALS, PRODUCTS, BRANDS, and PROCESSES: When multiple requirements are given for an item complies with all.
- 1.2.9 REFERENCE NOTES: Terms such as "as shown", "as indicated", "as noted" mean there are additional requirements given elsewhere in the Contract Documents. Comply with all requirements.
- 1.2.10 ABBREVIATIONS AND NAMES: Acronyms or abbreviations as referenced in contract documents and listed on the General Abbreviations and Symbols Sheet G1.0 are defined to mean the associated names. Acronyms or abbreviations are subject to change, and believed to be, but not assured to be, accurate and up-to-date as of date of contract documents.

- 1.2.11 DRAWING SYMBOLS AND STANDARDS: Except as otherwise indicated, graphic symbols and standards used on drawings are those symbols recognized in the construction industry for purposes indicated.
- 1.2.12 M/E DRAWINGS: Graphic symbols used on Mechanical/Electrical drawings are generally aligned with symbols recommended by ASHRAE, supplemented by more specific symbols where appropriate as recommended by other recognized technical associations including ASME, ASPE, IEEE and similar organizations. Refer instances of uncertainty to Architect for clarification before proceeding.
- 1.2.13 STANDARD REFERENCES: Any materials, equipment or workmanship specified by references to number, symbol, or title of any specific Federal, ASTM, Industry, Association or Government Agency Standard Specifications shall comply with all applicable provisions of such standard specifications, except as limited to type, class or grade, or modified in contract documents. Reference to "Standards" referred to in the contract documents, except as modified, shall have full force and effect as though printed in detail in specifications.
- 1.2.14 PUBLICATION DATES, except as otherwise indicated, where compliance with an industry standard, ASTM, association standard, or Federal Standard, shall meet the standard in effect as of date of Contract Documents.
- 1.2.15 ACCEPTABLE MANUFACTURERS where used in the Project Manual shall mean that the listed products and manufacturers shall meet specified and indicated requirements.

Article 2 - Owner

Addition: new text as follows (sub-subparagraph to 2.2.1):

- 2.2.1.1 "The Owner shall establish site property lines by staking or other means, shall establish a permanent bench mark, and provide copies of soil boring logs and soil report, if any, for the Contractor's convenience

and information. None of the data therein relating to sub-surface soil and water conditions; size, elevation and location of existing underground services; existing underground obstructions or structures; etc., are guaranteed as being accurate or uniformly representative of actual conditions. The Owner assumes no responsibility for deductions, interpretations or conclusions drawn there from by the Contractor."

Article 3 - Contractor

- 3.4.2.1 Should the Contractor desire after the Contract Award, to substitute for the benefit of the Owner another article, material or item of equipment for one or more specified by name, he shall make a request for such substitution in writing, to the Architect stating the benefit to the Owner and the credit or extra involved and he shall provide all required supporting data and samples. If such request is rejected, the Contractor shall perform the work in accordance with the Contract Documents. Such requests shall be submitted so as to allow a reasonable time for their consideration and shall not be justification for delay of the work.
- 3.4.2.2 If a substitution requires changes in the work or other trades or Contractors, or redesign or other substantial changes in the Contract Documents, the Contractor proposing the substitution shall pay any additional costs thereby incurred.
- 3.4.2.3 After Contract Award, no substitution of any material listed in the Contract Documents or Proposal will be permitted if the request is based on delivery dates, test requirements, or other causes, unless the Bidder proves that the original material was ordered or scheduled for tests within (30) thirty days after the contract was let and due to unforeseen circumstances cannot be delivered at the promised time or tested in accordance with the specifications without materially delaying work.

3.4.2.4 by making requests for substitutions based on Clause 3.4.2.1 above, the Contractor:

- (a) represents that the Contractor has personally investigated the proposed substitute product and determined that it is equal or superior in all respects to that specified;
- (b) represents that the Contractor will provide the same warranty for the substitution that the Contractor would for that specified;
- (c) certifies that the cost data presented is complete and includes all related costs under this Contract but excludes costs under separate contracts, and excludes the Architect's redesign costs, and waives all claims for additional costs related to the substitution which subsequently became apparent; and
- (d) Will coordinate the installation of the accepted substitute, making such changes as may be required for the Work to be complete in all respects.

3.4.2.5 Proofs of conformance, as hereinafter defined, will constitute satisfactory evidence as to the kind, quality and performance values of the respective products for which such proofs are required by the Specifications. Neither delivery nor installation of the respective products shall be made until written acceptance by the Architect of the submitted proof of conformance is received by the Contractor, unless Architect gives written instruction to the contrary.

3.4.2.6 Affidavit - An affidavit is a notarized statement on the letterhead of the manufacturer and signed by a responsible agent of the manufacturer, certifying that the product is in conformance with the requirements of the specified regulatory agency or reference standard or performance values, as applicable; in the case of the latter, the performance values shall be listed. Each Affidavit shall be identified by name of Project, Architect's Project number, name of product, and Specification section, page and paragraphs for which the product is proposed.

- 3.4.2.7 Testing Laboratory Certificate - A Testing Laboratory Certificate is a notarized test report from a laboratory, bureau or agency acceptable to the Architect, signed by a responsible agency of that facility, certifying that the designated product has been tested within one year of the date of submittal, unless otherwise specified, and is in conformance with the reference standard of performance requirements specified, and listing the results of all tests required. The testing laboratory certificate shall accompany an Affidavit as defined in clause 3.4.2.6.

Addition: new text as follows:

- 3.4.4 Materials supplied shall conform to industry and manufacturer's standards specified, in effect on the date of issuance of the specifications. Materials shall generally be shipped, received, stored, installed and protected in accordance with printed manufacturer's instructions as modified by the detailed provisions of the specifications. Copies of the printed manufacturer's or industry standards shall be maintained on file by the Contractor at his field office.
- 3.4.5 Not later than (72) seventy-two hours from the Contract Date or letter of intent to award contract, the Contractor shall provide a list showing the name of the manufacturer proposed to be used for each of the products identified in the General Requirements of the Specifications (Division 1) and, where applicable, the name of the installing Subcontractor.
- 3.4.6 The Architect will promptly reply in writing to the Contractor stating whether the Owner or the Architect, after due investigation, has reasonable objection to any such proposal. If adequate data on any proposed manufacturer or installer is not available, the Architect may state that action will be deferred until the Contractor provides further data. Failure of the Owner or Architect to reply promptly shall constitute notice of no reasonable objection. Failure to object

to a manufacturer shall not constitute a waiver of any of the requirements of the Contract Documents, and all products furnished by the listed manufacturer must conform to such requirements.

Addition: new paragraphs as follows:

3.9.4 The Contractors superintendent or his authorized representative shall remain in attendance at the project site and shall be present at all times when work of any kind is in progress, including overtime work.

3.13.1 Modification: Insert "the directions of the owner" into the paragraph to read in part as follows: "The Contractor shall confine operations at the site to areas permitted by law, ordinances, permits, the directions of the owner and the contract documents..."

Addition: new text as follows:

3.14.1.1 Unless specified otherwise, Work specified in each section of the specifications includes cutting, fitting, and patching for that trade section, including that required to accommodate the work of other trades.

Addition: new text as follows (paragraph to 3.15.1):

3.15.1.1 "The Contractor, each Subcontractor and all separate Contractors shall at all times keep the project free from their surplus and waste materials, and bulk rubbish and debris; combustible materials shall be removed daily or more often as may be required, non-combustible materials at least once a week. Such materials shall not be allowed to accumulate or disperse around the neighborhood. Further the Contractor is responsible for:

1. Positive implementation of the "General Safety Rules and Regulations for the Construction Industry", "State Construction Safety Commission, and appropriate City Ordinances as regards the scope of this paragraph.

2. Maintenance of the site and premises in an orderly and clean condition at all times.
3. Keeping all sidewalks, pavements, parking areas, floors and roofs free from any accumulations of snow, ice, dirt, rubbish and general refuse prior to "closing-in" of the building.
4. Broom clean (exclusive of removal of bulk debris described above) floors in all interior spaces where work is in progress after the project has been "closed-in", with the participation and cooperation of all Subcontractors and separate Contractors employed on the work.
5. Final cleaning of the entire building, including all interior finish materials, as specified in detail under Section 01700, Contract Closeout.

Addition: new text as follows (sub-subparagraph to 4.2.3):

- 4.2.3.1 The Architects presence does not imply concurrence or approval of the work. The Contractor shall call specific things to the Architect's attention if he wishes to know the Architects opinion.

Addition: new text as follows (sub-paragraph to 5.2.1):

- 5.2.1.1 The Contractor shall have primary responsibility for obtaining bids and preparing and awarding Subcontracts for all portions of the Work (except General Condition Items).

- 5.4.1 Deletion: sub-paragraph & sub-subparagraphs in its entirety

Addition: new text as follows:

- 5.4.1 Unless the Owner elects otherwise, all Subcontracts shall be between the Contractor and the appropriate Subcontractor, and shall provide that the Subcontractor consents to the assignment of the Subcontract to the Owner pursuant to Section 5.3.4 hereof, and agrees in the event such assignment becomes effective, to recognize the Owner as successor to the Contractor and to complete the Work under the Subcontract.

- 5.4.2 The Contractor shall cause all Subcontractors, laborers and vendors to agree to indemnify the Owner and hold it harmless from all claims for property damage and bodily injury that may arise from such Subcontractor's operations. Such provisions shall be in a form reasonably satisfactory to Owner.
- 5.4.3 The agreement between Contractor and the Subcontractors (and, where appropriate, between Subcontractors and Sub-Subcontractors) shall contain provisions that:
- 5.4.3.1 Preserve and protect the right of the owner and the Architect under this Agreement with respect to the Work to be performed under the Subcontract so that the subcontracting thereof will not prejudice such rights;
- 5.4.3.2 Require that such Work be performed in accordance with the requirements of these Contract Documents;
- 5.4.3.3 Require submission to Contractor of applications for payment under each Subcontract and Sub-Subcontract, in reasonable time to enable Contractor to apply for payment in accordance with General Conditions of the Construction Contract, all such applications to be in a form that fully complies with all requirements of the Michigan Construction Lien Act, the Michigan Builder's Trust Fund Act, any other requirements of law, the requirements of any financing agency and any requirements of Owner and Owner's title insurer to demonstrate the foregoing;
- 5.4.3.4 Require that all claims for additional costs or extension of time with respect to subcontracted portions of the Work shall be submitted to Contractor (via any Subcontractor or Sub-Subcontractor where appropriate) in sufficient time so that Contractor may comply in the manner provided, if any, in this Agreement for a like claim by Contractor upon the Owner;

5.4.3.5 Waive all rights the contracting parties may have against one another for damages caused by fire or other perils covered by the property insurance described in General Conditions hereof;

5.4.4 Contractor hereby assigns to Owner, as security for Contractor's performance hereunder, all Subcontracts and all other contracts and agreements entered into in connection with the Project, and appoints Owner is attorney to enforce said contracts according to their terms. Such assignment shall be operative only in the event of default by, or termination of, Contractor under this Agreement.

7.3.3 Modification: change paragraph number to 7.3.3
Addition: insert new item after 7.3.3.4 as follows:
".5 cost to be determined based on estimated cost of materials, equipment and labor for the work, plus the percentage thereof stated in the Contract Documents for supervision, overhead and profit."

Addition: new text as follows:

8.3.4 Should the progress of the Work or of the Project be delayed by any fault or neglect or act or failure to act of the Contractor or any of Contractor's agents, employees, or anyone for whose acts any of them may be liable, so as to cause additional cost, expense, liability or damage to the Owner or damages or additional costs or expenses for which the Owner may or shall become liable, the Contractor shall and does hereby agree to compensate the Owner for and indemnify him against such costs, expenses, damages and liability.

Addition: new paragraph as follows:

9.3.1 Modification: change existing text to read as follows:
"At least (20) twenty days before the date established for each progress payment, the Contractor shall submit to the Architect an itemized Application for Payment for operations completed in accordance with the schedule of

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values. The Contractor shall be responsible to ensure that Application for Payment is complete, including notarized signature. A Sworn Statement from Contractor and partial waivers of lien from Subcontractors and major materials Suppliers shall also accompany each payment request, to confirm and acknowledge disbursement of the preceding payment. The Sworn Statement shall be a record attesting to the fact that sub-constructors suppliers, materials, etc. have been paid or paid for, when considering materials, from the time of the last application for payment by the Contractor. Partial waivers of lien shall be properly completed and shall list the cumulative amounts of payments received by the date of the waiver. This requirement shall not be waived unless agreed upon in writing by both the Surety and Owner."

Addition: new text as follows (sub-subparagraph to 11.2)

11.2.1.1 The insurance required by sub-paragraph 11.2.1 shall be written and maintained without interruption from date of commencement of the work until date of final payment and termination of any coverage required to be maintained after final payment for not less than the following (or greater if required by law):

1. Workers' Compensation

- | | |
|---|---------------|
| (a) State: Michigan | Statutory |
| (b) Applicable Federal (e.g., Longshoremen, harbor work, Work at or outside U.S. Boundaries): | Statutory |
| (c) Employer's Liability: | \$1,000,000 |
| (d) Benefits Required by Union labor Contracts: | As applicable |

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2. Comprehensive General Liability (Including Premises-Operations; Independent Contractors' Protective; Products and Completed Operations; Broad Form Property Damage):
- (a) Bodily Injury:
 - \$1,000,000 Each Occurrence
 - \$1,000,000 Aggregate, Products & Completed Operations
 - (b) Property Damage:
 - \$1,000,000 Each Occurrence
 - \$1,000,000 Aggregate
 - (c) Products and Completed Operations Insurance shall be maintained for a minimum period of 1 year after final payment and Contractor shall continue to provide evidence of such coverage to Owner on an annual basis during the aforementioned period.
 - (d) Property Damage Liability Insurance shall include coverage for the following hazards:
 - X (Explosion)
 - C (Collapse)
 - U (Underground)
 - (e) Contractual Liability (Hold Harmless Coverage):
 - (1) Bodily Injury:
 - \$1,000,000 Each Occurrence
 - (2) Property Damage:
 - \$1,000,000 Each Occurrence
 - \$1,000,000 Aggregate
 - (f) Personal Injury, with Employment Exclusion deleted:
 - \$1,000,000 Aggregate

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3. Comprehensive Automobile Liability (owned, non-owned, and hired):
 - (a) Bodily Injury:
 - \$1,000,000 Each Person
 - \$1,000,000 Each Accident
 - (b) Property Damage:
 - \$1,000,000 Each Occurrence

NOTE: The State of Michigan has a no-fault insurance requirement. The Contractor shall be certain coverage is provided which conforms to any specific stipulation in the law.

11.2.2.2 Contractor shall procure and maintain builders risk insurance (Fire and Extended Coverage) on 100% completed value basis including the value of all materials furnished by parties other than the Contractors for installation in the project to cover all project structures and materials, supplies, equipment and fixtures including the installation cost thereof which are owned by the insured or for which the insured is legally liable. This policy is to have a zero (0) deductible for any and all claims made.

This policy will cover the property of insured a) while in transit at the risk of the insured, b) while on the construction site or awaiting installation, c) during construction installation or testing. This policy shall insure against all risk of direct physical damage or loss to the property insured hereunder and shall specially cover loss due to fire, wind, flood, collapse, extended coverage, vandalism and malicious mischief.

The Owner and Architect/Engineer and their consultants for this project shall be named on the policy as being also insured.

11.2.2.3 Subcontractor's Public Liability and Property Damage Insurance and Vehicle Liability Insurance:

(a) The Contractor shall either:

- (1) Require each of his subcontractors to procure and to maintain during the life of his subcontract, Subcontractor's Public Liability and Property Damage Insurance and Vehicle Liability Insurance of the type and in the amounts specified for the Contractor herein, or
- (2) Insure the activities of his subcontractors in his policy as specified herein.

Umbrella Excess Liability:

- (a) Umbrella Excess Liability must be supplied in an amount not less than \$2,000,000 and be made to cover at least all risks described in the Comprehensive General Liability and Comprehensive Motor Vehicle Liability policies.

11.2 Change: Where Owner is indicated change to Contractor

11.2.1 Modification: change the text to read as follows: "The Contractor shall obtain, maintain in force, and pay all cost incurred for, public liability insurance to protect the Owner & Architect/Engineer and their consultants for this project from claims which may arise from operations under the Contract. This policy is to have a zero (0) deductible for any and all claims made and name Owner and Architect/Engineer and their consultants as insured parties hereunder. Certificates of this insurance must be filed with the Owner and the Architect/Engineer prior to commencing work and remain in force for the full duration of the project.

11.2.1 Modification: delete phrase "Unless otherwise provided, the Owner..." in the first sentence and substitute, "The Contractor..."

- 11.2.1 Modification: change text of last part of first sentence after the phrase, "...at the site on a replacement cost basis..." to following text, "...with a zero deductible for any and all claims made."
- 11.2.1 Modification: change text of last sentence to read as follows: "This insurance shall name, in addition to the contractor, subcontractors and sub-subcontractors, the Owner and Architect/Engineer and their consultants as insured parties hereunder."
- 11.2.1 Addition: After last sentence insert the following: "The form of policy for this coverage shall be Completed Value. If the Owner is damaged by the failure of the Contractor to maintain such insurance, then the Contractor shall bear all reasonable costs properly attributable thereto."
- 11.2.2 Deletion: omit entire sub-subparagraph.
- 11.2.3 Change: Owner to Contractor and Contractor to Owner respectively where occurring in the original text
- 11.4 Addition: to end of last sentence insert the following: "...unless through gross negligence of contractor."
- 11.5.1 Revise Owner to Contactor and Contractor to Owner. Revise last paragraph to read; The Contractor shall pay the Architect and Owner their just shares of insurance proceeds received by the Contractor and by appropriate agreements the Architect and Owner shall make payments to their consultants and Contractor shall pay their own consultants in a similar manner.
- 11.1.2.1 Addition: "The Contractor shall furnish bonds covering faithful performance of the Contract and payment of obligations arising hereunder. Bonds may be obtained through the Contractors usual source and the cost thereof shall be included in the Contract Sum. The amount of each bond shall be equal to 100% of the total contract sum."

Addition: new text as follows (sub-subparagraph to 11.2.1):

11.1.2.2 The Contractor shall deliver the required bonds to the Owner not later than three days following the date the Agreement is entered into, or if the Work is to be commenced prior thereto in response to a letter of intent, the Contractor shall, prior to the commencement of the Work, submit evidence satisfactory to the Owner that such bonds will be furnished.

Addition: new text as follows (sub-subparagraph to 11.1.2):

11.1.2.3 The Contractor shall require the attorney-in-fact who executes the required bonds on behalf of the surety to affix thereto a certified and current copy of the power of attorney.

12.2.1 Addition: insert new text before first sentence: The Contractor, as a condition precedent to final payment, shall execute a guarantee in writing, warranting all products provided by him or for which he may be required to accept responsibility in accordance with the terms of the Contract Documents, to be and to remain without defect and in accordance with the Contract Documents.

12.2.2.1 Modification: in fifth line, after the words "shall correct it promptly", insert the words: "...commencing corrective action within seven days..."

Addition: new text as follows (sub-subparagraph to 12.2.2.1):

12.2.2.1 Where special guarantee is specified, the Contractor, as a condition precedent to final payment, shall submit to the Architect the guarantee in triplicate on 8-1/2-inch by 11-inch paper in the following form:

Wakely Project Number _____
Contractor's Job Number _____
Date _____

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Guaranteed Work _____

Specification Section Number
Reference _____

Specification Page and
Paragraphs Describing
Guarantee _____

Length of Guarantee (Years) _____

Contractor _____

Subcontractor _____

The Undersigned herewith warrant that the Work to which this guarantee applies has been executed in conformance with the requirements of the Contract Documents, and guarantee the Work to perform as specified without failure for the stated period of time after Substantial Completion or as otherwise agreed to by the Owner.

This guarantee does not apply to failure or to failure to perform due to abuse or neglect by the Owner, or his successor in interest, or damage by vandalism.

SUBCONTRACTOR -

Signed _____

Title _____

Notary _____

Date _____

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CONTRACTOR -

Signed _____

Title _____

Notary _____

Date _____

12.2.2.2 Responsibility for the securing, verifying, recording, transmitting to the Architect, and all other actions, regarding the specified special guarantees rests with the Contractor. The Architect will not accept transmittals of guarantees from parties other than the Contractor.

Addition: new text as follow (sub-subparagraph to 12.2.3):

12.2.3.1 Limits of non-conforming Work: When any such Work is found, the entire area of work involved shall be corrected unless the Contractor can completely define the limits. Additional testing, sampling, or inspecting needed to define non-conforming work shall be at the contractor's expense. They shall employ the Owner's independent testing laboratory, or a mutually satisfactory independent testing laboratory, if such services are required. All corrected work shall be re-tested at the Contractor's expense.

Addition: new text as follows: (sub-subparagraph to 12.2.4):

12.2.4.1 Restriction of Supplier's Identification: In areas generally accessible to the public. Omit all supplier's name plates and identification symbols from visible products.

14.2.1 Addition: new text as follows, sub-subparagraph after last item listed: ".5 should cause or give cause for legal proceeding seeking to have himself adjudged a bankrupt, or should the Contractor become insolvent, or if the contractor is adjudged a bankrupt, or if he makes a general assignment for the benefit of his creditors."

Addition: new article as follows:

Article 16

Equal Opportunity

16.1 The Contractor shall maintain policies of employment as follows:

16.1.1 The Contractor and all Subcontractors shall not discriminate against any employee or applicant for employment because of race, religion, color, sex, national origin or age. The Contractor shall take affirmative action to insure that applicants are employed, and that employees are treated during employment without regard to their race, religion, color, sex, national origin or age. 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.

16.1.2 The Contractor and all Subcontractors 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, religion, color, sex, national origin or age. Addition: new article as follows:

WARREN WOODS PUBLIC SCHOOLS
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Article 17

Special Conditions

17.1 Michigan Construction Lien Statute

17.1.1 Contractor must record the notice of commencement, on behalf of the Owner, with the Register of Deeds and shall post the notice in a conspicuous place on the site.

Addition: new article as follows:

Article 18

Abbreviations

18.1 Abbreviations

18.1.1 When the following abbreviations and symbols are used in the Contract Documents, or Subcontract documents, they shall have the meaning shown. Many of the abbreviations used throughout the Subcontract documents refer to associations, institutes, societies and other public bodies who publish standards which are readily available to the public. Whenever the initials representing such a body are shown, followed by a number or a combination of numbers and letters, they refer to a particular standard to which the Subcontractor shall conform. The number or combination of numerals and letters, following the abbreviation designates the standard. In all such cases, the Subcontractor shall conform to the edition or issue of the standard which is current at the Subcontract date, as revised or amended to the Subcontract date.

18.1.2 Abbreviations and Meanings for Organizations.

| | |
|-------|--|
| AIA | American Institute of Architects |
| AASHO | American Association of State Highway Officials |
| ACI | American Concrete Institute |

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| | |
|----------|--|
| AIEE | American Institute of Electrical Engineers |
| AISC | American Institute of Steel Construction |
| ASA | American Standard Association |
| ASH & AE | American Society of Heating & Air Conditioning Engineers |
| ASME | American Society of Mechanical Engineers |
| ASTM | American Society for Testing and Materials |
| AWI | American Woodwork Institute |
| AWSC | American Welding Society Code |
| CSI | Construction Specification Institute |
| FS | Federal Specifications |
| NAFM | National Association of Fan Manufacturers |
| NBFU | National Board of Fire Underwriters |
| NBS | National Bureau of Standards |
| NEC | National Electric Code |
| NEMA | National Electrical Manufacturers Association |
| UL | Underwriters Laboratories |
| USDC | U.S. Department of Commerce |

18.1.3 Abbreviations and Meanings for Construction Terms.

| | | | |
|-------|-----------------------|-------|----------------------|
| ad | access door | oc | on center |
| b | bottom layer reinf. | od | outside diameter |
| | concrete | part | partition |
| brg | bearing | pol | polished |
| brkt | bracket | | |
| cl | centerline | po | polyethylene |
| ci | cast iron | pl | plate |
| cc | center to center | psi | pounds per sq. in. |
| conc | concrete | psf | pounds per sq. foot |
| cont | continuous | rec | recessed |
| csk | countersunk | reinf | reinforced |
| crs | courses | rh | right hand |
| dh | double hung | rhr | right hand reverse |
| div | division | rm | room |
| dpc | dampproof course | rs | roof sump |
| dwg | drawing | rwc | rain water conductor |
| ef | exhaust fan | rwl | rain water leader |
| elev | elevation | s.f. | square foot |
| ewc | electric water cooler | ss | stainless steel |
| exist | existing | std | standard |
| fin | finished, finishing | t&f | tongue and groove |

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| | | | |
|--------|-------------------------------|------|--------------------------------------|
| ftg | footing | terr | terrazzo |
| fd | floor drain | typ | typical |
| flr/fl | floor | u/s | underside |
| ga | gauge | ul | upper layer reinf. |
| gi | galvanized iron | | concrete |
| gs | galvanized sheet | vct | vinyl composition |
| gsg | galvanized sheet gauge | | tile |
| hor | horizontal | vb | vapor barrier |
| ins | inches | vert | vertical |
| id | inside diameter | wc | water closet |
| ksf | kips per square foot | wt | weight |
| lav | lavatory | wd | wood |
| lh | left hand | | |
| lhr | left hand reverse | E-W | East to West in reinf. concrete |
| lpc | laminated plastic covering | N-S | North to South in reinf. concrete |
| mk | master keyed | | diameter |
| max | maximum | O/ | foot, feet |
| met | metal | ' | |
| min | minimum | | |
| mfgr | manufacturer | " | inch, inches |
| ms | manufacturers standard | # | pounds (behind numerals) |
| mo | masonry opening | | |
| nrc | noise reduction coefficient | | |

END OF SECTION



STATE OF MICHIGAN

Wage and Hour Division
PO Box 30476
Lansing, MI 48909
517-284-7800

Informational Sheet: Prevailing Wages on State Funded Projects

REQUIREMENTS

Effective February 13, 2024

The purpose of establishing prevailing rates is to provide minimum rates of pay that must be paid to workers on construction projects that are financed or financially supported by the state. Prevailing rates compiled from the rates contained in collectively bargained agreements which cover the locations of the state projects. While the prevailing wage rates are compiled through surveys of collectively bargained agreements, a collective bargaining agreement is not required for contractors to be on or be awarded state projects. The prevailing rate schedule provides an hourly rate which includes wage and fringe benefit totals for designated construction mechanic classifications. The overtime rates also include wage and fringe benefit totals. Please pay special attention to the overtime and premium pay requirements. The prevailing wage is satisfied when wages plus fringe benefits are equal to or greater than the required rate.

State of Michigan responsibilities:

- The department establishes the prevailing rate for each classification of construction mechanic requested by the contracting agents prior to contracts being let out for bid on a state project.

DTMB responsibilities

- If a contract is not awarded or construction does not start within 90 days of the date of the issuance of rates, a re-determination of rates must be requested by the contracting agents.
- Rates for classifications needed but not provided on the Prevailing Rate Schedule, **must** be obtained **prior** to contracts being let out for bid on a state project.

Contractor responsibilities:

- Every contractor and subcontractor shall keep posted on the construction site, in a conspicuous place, a copy of all prevailing rates prescribed in a contract.
- Every contractor and subcontractor shall keep an accurate record showing the name and occupation of and the actual wages and benefits paid to each construction mechanic. This record shall be available for reasonable inspection by DTMB or the department.
- Each contractor or subcontractor is liable for the payment of the prevailing rate to its employees.
- The prime contractor is responsible for advising all subcontractors of the requirement to pay the prevailing rate prior to commencement of work.
- A construction mechanic *shall only* be paid the apprentice rate if registered with the United States Department of Labor, Bureau of Apprenticeship and Training and the rate is included in the contract.

Enforcement:

A person who has information of an alleged prevailing wage violation on a prevailing wage project may file a complaint with the State of Michigan. The department will investigate and attempt to resolve the complaint informally. During the course of an investigation, if the requested records and posting certification are not made available in compliance with contractual requirements, the Contracting Agent may consider the Contractor to be in material breach of the contract and may terminate the contract for cause at the sole discretion. There are also civil penalties for failure to be in compliance with Act 10. View the entire text of Act 10 of 2023 at michigan.gov/wagehour.



STATE OF MICHIGAN
Informational Sheet: Prevailing Wages on State Projects

General Information Regarding Fringe Benefits

Certain fringe benefits **may** be credited toward the payment of the Prevailing Wage Rate:

- If a fringe benefit is paid directly to a construction mechanic
- If a fringe benefit contribution or payment is made on behalf of a construction mechanic
- If a fringe benefit, which may be provided to a construction mechanic, is pursuant to a written contract or policy
- If a fringe benefit is paid into a fund, for a construction mechanic

When a fringe benefit is not paid by an hourly rate, the hourly credit will be calculated based on the annual value of the fringe benefit divided by 2080 hours per year (52 weeks @ 40 hours per week).

The following is an example of the types of fringe benefits allowed and how an hourly credit is calculated:

| | | |
|----------------------------|--|---------------|
| Vacation | 40 hours X \$14.00 per hour = \$560/2080 = | \$0.27 |
| Dental insurance | \$31.07 monthly premium X 12 mos. = \$372.84 /2080 = | \$.18 |
| Vision insurance | \$5.38 monthly premium X 12 mos. = \$64.56/2080 = | \$.03 |
| Health insurance | \$230.00 monthly premium X 12 mos. = \$2,760.00/2080 = | \$1.33 |
| Life insurance | \$27.04 monthly premium X 12 mos. = \$324.48/2080 = | \$.16 |
| Tuition | \$500.00 annual cost/2080 = | \$.24 |
| Bonus | 4 quarterly bonus/year x \$250 = \$1000.00/2080 = | \$.48 |
| 401k Employer Contribution | \$2000.00 total annual contribution/2080 = | \$.96 |
| Total Hourly Credit | | \$3.65 |

Other examples of the types of fringe benefits allowed:

- Sick pay
- Holiday pay
- Accidental Death & Dismemberment insurance premiums

The following are examples of items that **will not** be credited toward the payment of the Prevailing Wage Rate

- Legally required payments, such as:
 - Unemployment Insurance payments
 - Workers' Compensation Insurance payments
 - FICA (Social Security contributions, Medicare contributions)
- Reimbursable expenses, such as:
 - Clothing allowance or reimbursement
 - Uniform allowance or reimbursement
 - Gas allowance or reimbursement
 - Travel time or payment
 - Meals or lodging allowance or reimbursement
 - Per diem allowance or payment
- Other payments to or on behalf of a construction mechanic that are not wages or fringe benefits, such as:
 - Industry advancement funds
 - Financial or material loans



STATE OF MICHIGAN
Informational Sheet: Prevailing Wages on State Projects

OVERTIME PROVISIONS for MICHIGAN PREVAILING WAGE RATE COMMERCIAL SCHEDULE

- Overtime is represented as a nine character code. Each character represents a certain period of time after the first 8 hours Monday thru Friday.

| | Monday thru Friday | Saturday | Sunday & Holidays | Four 10s |
|---------------|--------------------|----------|-------------------|----------|
| First 8 Hours | | 4 | | |
| 9th Hour | 1 | 5 | 8 | 9 |
| 10th Hour | 2 | 6 | | |
| Over 10 hours | 3 | 7 | | |

Overtime for Monday thru Friday after 8 hours:

the 1st character is for time worked in the 9th hour (8.1 - 9 hours)
the 2nd character is for time worked in the 10th hour (9.1 - 10 hours)
the 3rd character is for time worked beyond the 10th hour (10.1 and beyond)

Overtime on Saturday:

the 4th character is for time worked in the first 8 hours on Saturday (0 - 8 hours)
the 5th character is for time worked in the 9th hour on Saturday (8.1 - 9 hours)
the 6th character is for time worked in the 10th hour (9.1 - 10 hours)
the 7th character is for time worked beyond the 10th hour (10.01 and beyond)

Overtime on Sundays & Holidays

The 8th character is for time worked on Sunday or on a holiday

Four Ten Hour Days

The 9th character indicates if an optional 4-day 10-hour per day workweek can be worked **between Monday and Friday without paying overtime after 8 hours worked, unless otherwise noted in the rate schedule. To utilize a 4 ten workweek, notice is required from the employer to employee prior to the start of work on the project.**

- Overtime Indicators Used in the Overtime Provision:

H - means TIME AND ONE-HALF due
X - means TIME AND ONE-HALF due after 40 HOURS worked
D - means DOUBLE PAY due
Y - means YES an optional 4-day 10-hour per day workweek can be worked without paying overtime after 8 hours worked
N - means NO an optional 4-day 10-hour per day workweek *cannot* be worked without paying overtime after 8 hours worked

- EXAMPLES:

HHHHHHHDN - This example shows that the 1½ rate must be used for time worked after 8 hours Monday thru Friday (characters 1 - 3); for all hours worked on Saturday, 1½ rate is due (characters 4 - 7). Work done on Sundays or holidays must be paid double time (character 8). The N (character 9) indicates that 4 ten-hour days is not an acceptable workweek at regular pay.

XXXHHHDY - This example shows that the 1½ rate must be used for time worked after 40 hours are worked Monday thru Friday (characters 1-3); for hours worked on Saturday, 1½ rate is due (characters 4 – 7). Work done on Sundays or holidays must be paid double time (character 8). The Y (character 9) indicates that 4 ten-hour days is an acceptable alternative workweek.



STATE OF MICHIGAN
Informational Sheet: Prevailing Wages on State Projects

ENGINEERS - CLASSES OF EQUIPMENT LIST

UNDERGROUND ENGINEERS

CLASS I

Backfiller Tamper, Backhoe, Batch Plant Operator, Clam-Shell, Concrete Paver (2 drums or larger), Conveyor Loader (Euclid type), Crane (crawler, truck type or pile driving), Dozer, Dragline, Elevating Grader, End Loader, Gradall (and similar type machine), Grader, Power Shovel, Roller (asphalt), Scraper (self propelled or tractor drawn), Side Broom Tractor (type D-4 or larger), Slope Paver, Trencher (over 8' digging capacity), Well Drilling Rig, Mechanic, Slip Form Paver, Hydro Excavator.

CLASS II

Boom Truck (power swing type boom), Crusher, Hoist, Pump (1 or more 6" discharge or larger gas or diesel powered by generator of 300 amps or more, inclusive of generator), Side Boom Tractor (smaller than type D-4 or equivalent), Tractor (pneu-tired, other than backhoe or front end loader), Trencher (8' digging capacity and smaller), Vac Truck.

CLASS III

Air Compressors (600 cfm or larger), Air Compressors (2 or more less than 600 cfm), Boom Truck (non-swinging, non-powered type boom), Concrete Breaker (self-propelled or truck mounted, includes compressor), Concrete Paver (1 drum, ½ yard or larger), Elevator (other than passenger), Maintenance Man, Mechanic Helper, Pump (2 or more 4" up to 6" discharge, gas or diesel powered, excluding submersible pump), Pumpcrete Machine (and similar equipment), Wagon Drill Machine, Welding Machine or Generator (2 or more 300 amp or larger, gas or diesel powered).

CLASS IV

Boiler, Concrete Saw (40HP or over), Curing Machine (self-propelled), Farm Tractor (w/attachment), Finishing Machine (concrete), Firemen, Hydraulic Pipe Pushing Machine, Mulching Equipment, Oiler (2 or more up to 4", exclude submersible), Pumps (2 or more up to 4" discharge if used 3 hrs or more a day-gas or diesel powered, excluding submersible pumps), Roller (other than asphalt), Stump Remover, Vibrating Compaction Equipment (6' wide or over), Trencher (service) Sweeper (Wayne type and similar equipment), Water Wagon, Extend-a-Boom Forklift.

HAZARDOUS WASTE ABATEMENT ENGINEERS

CLASS I

Backhoe, Batch Plant Operator, Clamshell, Concrete Breaker when attached to hoe, Concrete Cleaning Decontamination Machine Operator, Concrete Pump, Concrete Paver, Crusher, Dozer, Elevating Grader, Endloader, Farm Tractor (90 h.p. and higher), Gradall, Grader, Heavy Equipment Robotics Operator, Hydro Excavator, Loader, Pug Mill, Pumpcrete Machines, Pump Trucks, Roller, Scraper (self-propelled or tractor drawn), Side Boom Tractor, Slip Form Paver, Slope Paver, Trencher, Ultra High Pressure Waterjet Cutting Tool System Operator, Vactors, Vacuum Blasting Machine Operator, Vertical Lifting Hoist, Vibrating Compaction Equipment (self-propelled), and Well Drilling Rig.

CLASS II

Air Compressor, Concrete Breaker when not attached to hoe, Elevator, End Dumps, Equipment Decontamination Operator, Farm Tractor (less than 90 h.p.), Forklift, Generator, Heater, Mulcher, Pigs (Portable Reagent Storage Tanks), Power Screens, Pumps (water), Stationary Compressed Air Plant, Sweeper, Water Wagon and Welding Machine.



STATE OF MICHIGAN
Informational Sheet: Prevailing Wages on State Projects

CARPENTER CRAFT JURISDICTION

Michigan recognizes the Carpenters for any and all work related to weatherization that has historically been the work of the Carpenter. This work shall include, but not be limited to: all work defined under the Federal Weatherization Assistance Program.

The jurisdiction of Carpenters, as to all work that has historically and traditionally been performed consisting of the milling, fashioning, joining, assembling, erecting, fastening or dismantling of all materials of wood, plastic, metal, fiber, cork, or composition and all other substitute materials, as well as the handling, cleaning, erecting, installing and dismantling of all machinery, equipment and all materials used by Carpenters.

The jurisdiction, therefore, extends over the following divisions and subdivisions of the trade: Carpenters and Joiners, Millwrights, Pile Drivers, Bridge, Dock and Wharf Carpenters, Underpinners, Timbermen, and Core-drillers, Shipwrights, Boat Builders, Ship-hand, Stair-Builders, Millmen, Wood and Resilient Floor Decorators, Floor Finishers, Carpet-layers, Shinglers, Siders, Insulators, Acoustic and Drywall Applicators, Sharers and House Movers, Loggers, Lumber and Sawmill Workers, Reed and Rattan Workers, Shingle Weavers, Casket and Coffin Makers, Railroad Carpenters and Car Builders, regardless of material used and all those engaged in the operation of woodworking or other machinery required in fashioning, milling or manufacturing of products used in the trade, and the handling, erecting and installing materials on any of the above divisions or sub-divisions, burning, welding and rigging incidental to the trade. When the term "Carpenter and Joiner" is used, it shall mean all the subdivisions of the trade. The trade autonomy of Carpenters therefore extends over the divisions and subdivisions of the trade, which are set forth as follows:

- (a) The framing, erecting and prefabrication of roofs, partitions, floors and other parts of buildings of wood, metal, plastic or other substitutes; application of all metal flashing used for hips, valleys and chimneys; the erection of Stran Steel section or its equal. The building and setting of all forms and centers for brick and masonry. The fabrication and erection of all forms for concrete and decking, the dismantling of same (as per International Agreement) when they are to be re-used on the job or stored for re-use. The cutting and handling of all falsework for fireproofing and slabs. Where power is used in the setting or dismantling of forms, all signaling and handling shall be done by carpenters. The setting of templates for anchor bolts for structural members and for machinery, and the placing, leveling and bracing of these bolts. All framing in connection with the setting or metal columns. The setting of all bulkheads, footing forms and the setting of and fabrication of, screeds and stakes for concrete and mastic floors where the screed is notched or fitted, or made up of more than one member. The making of forms for concrete block, bulkheads, figures, posts, rails, balusters and ornaments, etc.
- (b) The handling and erecting of rough material and drywall, the handling, assembly, setting and leveling of all fixtures, display cases, all furniture such as tables, chairs, desks, coat racks, etc., all de-mountable or moveable partitions such as Von wall, E Wall, Steel Case, Herman Miller, Haworth, American Seating, Westinghouse, Lazy Boy, rosewood, etc. All rebuilding, remodeling and setting up of all kinds of partitions, finished lumber, metal and plastic trim to be erected by Carpenters shall be handled from the truck or vehicle delivering same to the job by Carpenters.



STATE OF MICHIGAN
Informational Sheet: Prevailing Wages on State Projects

CARPENTER CRAFT JURISDICTION

- (c) The building and moving of all scaffolding runways and staging where carpenters' tools are used, the building from the ground up of all scaffolds over fourteen (14) feet in height including metal and specially designed scaffolding. The building and construction of all hoists and derricks made of wood; the making of mortar boards, boxes, trestles, all shoring, razing and moving of buildings. Lift type trucks are to be considered a tool of the trade. Metal siding and metal roofing fall within the scope of jurisdiction for the carpenters.
- (d) The cutting or framing and fireproofing of the openings for pipes, conduits, ducts, etc., where they pass through floors, partitions, walls, roofs or fixtures composed in whole or in part of wood. The laying out of making and installation of all inserts and sleeves for pipes, ducts, etc., where carpenters' tools and knowledge are required. The making and installing of all wooden meter boards, crippling and backing for fixtures. The welding of studs and other fastenings to receive material being applied by carpenters.
- (e) The installation of all grounds, furring or stripping, ceilings and sidewalks, application of all types of shingling and siding, etc.
- (f) The installation of all interior and exterior trim or finish of wood, aluminum, kalamein, hollow or extruded metal, plastic, doors, transoms, thresholds, mullions and windows. The setting of jambs, bucks, window frames of wood or metal where braces or wedges are used. The installation of all wood, metal or other substitutes of casing, molding, chair rail, wainscoting, china closets, base of mop boards, wardrobes, metal partitions as per National Decisions or specific agreements, etc. The complete laying out, fabrication and erection of stairs. The making and erecting of all fixtures, cabinets, shelving, racks, louvers, etc. The mortising and application of all hardware in connection with our work. The sanding and refinishing of all wood, cork or composition floors to be sanded or scraped, filled, sized and buffed, either by hand or power machines. The assembling and setting of all seats in theaters, halls, churches, schools, auditorium, grandstands and other buildings. All bowling alley work.
- (g) The manufacture, fabrication and installation of all screens, storm sash, storm doors and garage doors; the installation of wood, canvas, plastic or metal awnings or eye shades, door shelters, jalousies, etc. The laying of wood, wood block and wood composition in floors.
- (h) The installation of all materials used in drywall construction, such as plasterboard, all types of asbestos boards, transite and other composition board. The application of all material which serves as base for acoustic tile, except plaster. All acoustical applications as per National Agreement or specific agreement.
- (i) The building and dismantling of all barricades, hand rails, guard rails, partitions and temporary partitions. The erection and dismantling of all temporary housing on construction projects.
- (j) The installation of rock wool, cork and other insulation material used for sound or weatherproofing. The removal of caulking and placing of staff bead and brick mold and all Oakum caulking, substitutes, etc., and all caulking in connection with carpentry work.
- (k) The installation of all chalk boards/marker boards.



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CARPENTER CRAFT JURISDICTION

- (l) The operation of all hand operated winches used to raise wooden structures.
- (m) The erection of porcelain enameled panels and siding.
- (n) The unloading and distribution of all furnished, prefabricated and built-up sections such as door bucks, window frames, cupboards, cabinets, store fixtures, counters and show cases or comparably finished or prefabricated materials, to the job sites or points of installation as used in the construction, alteration and remodeling industry.
- (o) The handling of doors, metal, wood or composite, partitions and other finished bulk materials used for trim from the point of delivery.
- (p) All processing of these materials and handling after processing.
- (q) The making up of panels and fitting them into walls, all bracing and securing, all removal of panels from the casting including all braces, walers, hairpins, etc.
- (r) The handling and setting of all metal pans and sections from the stock piles of reasonable distance as required by job needs shall be performed by carpenters. The stripping of such metal pans, panels or sections is to be performed by carpenters.
- (s) The sharpening of all carpenter hand or power tools, or those used by carpenters.
- (t) The layout, fabrication, assembling of and erection and dismantling of all displays made of wood, metal, plastic, composition board or any substitute material; the covering of same with any type of material, the crating and un-crating, the handling from the point of unloading and back to the point of loading of all displays and other materials or components.
- (u) The same shall apply to all other necessary component parts used for display purposes such as turntables, platforms, identification towers and fixtures, regardless of how constructed, assembled or erected or dismantled.
- (v) The make-up, handling, cutting and sewing of all materials used in buntings, flags, banners, decorative paper, fabrics and similar materials used in the display decorative industry for draperies and back drops. The decorative framing of trucks, trailers and autos used as floats or moving displays. The slatting of walls to hand fabrics and other decorative materials, drilling of all holes to accommodate such installations. Setting up and removal of booths constructed of steel or aluminum tubing as stanchions, railings, etc., handling and placing of furniture, appliances, etc., which are being used to complete the booth at the request of the exhibitor. Fabricating and application of leather, plastic and other like materials used for covering of booths. The handling of all materials, fabricating of same. The loading and unloading, erecting and assembling at the exhibit of show area, also in or out of storage when used in booth decorations.



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Informational Sheet: Prevailing Wages on State Projects

CARPENTER CRAFT JURISDICTION

- (w) A display shall be construed as any exhibit or medium of advertising, open to private or public showing, which is constructed of wood, metal, plastic or any other substitute to accomplish the objectives of advertising or displaying.
- (x) Handling, fitting, draping, measuring and installation of fixtures and other hardwares for draperies, all manner of making, measuring, repairing, sizing, hanging and installation of necessary fixtures and hardware for shades and Venetian blinds.
- (y) Work consisting of cutting and/or forming of all materials in preparation for installing of floors, walls and ceilings; the installation of all resilient floor and base; wall and ceiling materials to include cork, linoleum, prefabricated, laminated, rubber, asphalt, vinyl, metal, plastic, seamless floors and all other similar materials in sheet, interlocking liquid or tile form; the installation of all artificial turf, the installation, cutting and/or fitting of carpets; installation of padding, matting, linen crash and all preformed resilient floor coverings; the fitting of all devices for the attachment of carpet and other floor, wall and ceiling coverings; track sewing of carpets, drilling of holes for sockets and pins, putting in dowels and slats; and all metal trimmings used; the installation of all underlayments, sealants in preparation of floors, walls and ceilings, the unloading and handling of all materials to be installed and the removal of all materials in preparing floors when contracted for by the employer, shall be done only by employees covered under this Agreement.
- (z) The installation of all sink-tops and cabinets, to include all metal trim and covering for same. All cork, linoleum, congo-wall, linewall, veos tile, plexiglass, vinawall tile, composition tile, plastic tile, aluminum tile and rubber in sheets or tile form and the application thereof. All bolta-wall and bolta-wall tile and similar products.
- (aa) The handling and placing of all pictures and frames and the assembly of bed frames and accessories. The hanging and placing of all signage.
- (bb) The installation of all framework partitions and trim materials for toilets and bathrooms made of wood, metal, plastics or composition materials; fastening of all wooden, plastic or composition cleats to iron or any other material for accessories.
- (cc) The erection of cooling towers and tanks.
- (dd) The setting, lining, leveling and bracing of all embedded plates, rails and angles. The setting of all stay in place forms.
- (ee) Environmental: Clean room, any type of environmental chamber, walk in refrigerated coolers and all refrigerated rooms or buildings.



STATE OF MICHIGAN
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CARPENTER CRAFT JURISDICTION

PILE DRIVING AND CAISSON DRILLING

(ff) All unloading, handling, signaling and driving of piles, whether wood, steel, pipe, beam pile, composite, concrete or molded in place, wood and steel sheeting, cofferdam work, trestle work, dock work, floating derricks, caisson work, foundation work, bridge work, whether old or new, crib work, pipe line work and submarine work. Cutting of all wood, steel or concrete pile, whether by machine or hand; welding and cutting, peeling, and heading of all wood pile, steel sheeting and wood sheeting. The erecting and dismantling of all pile driving rigs, also derricks whether on land or water; also the moving, shoring and underpinning of all buildings. The loading and unloading of all derricks, cranes and pile driving materials. The tending, maintenance and operation of all valves pertaining to the operation of driving of pile. All diving and tending essential to the completion of jurisdictional claims.

All work done in the established yards of the Company and all work not enumerated above, shall be handled and manned as the Employer decides.

The pile driver will unload all material shipped in by rail from the point that the rail car is spotted.

All cleaning and preparation of all piling prior to driving.

The welding and attachment of all boot plates, pile points, splice plates, connectors, rock crosses, driving crosses, driving rigs, point reinforcements and overboots.

The construction, reconstruction, repair, alteration, demolition and partial or complete removal of all marine work including, but not limited to, docks, piers, wharves, quays, jetties, cribs, causeways, breakwaters, lighthouses and permanent buoys, etc. (mixing and placing of concrete excepted).

The driving and pulling of all wood, steel and concrete foundation piles and sheet piling.

The heading, pointing, splicing, cutting and welding of all piles.

The placing of all wales, bolts, studs, lagging, rods and washers including the cutting, drilling, boring or breaking of all holes or openings thereof.

The removal of all materials and/or obstructions of any nature (rip-rap included) that retard or interfere with the driving of piles or with the placing of wales, bolts and rods.



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CARPENTER CRAFT JURISDICTION

This is to be subject to the discretion of the contractor who may choose to use blasting specialists or other demolition specialists.

The handling on the job of all materials used in the work.

The manning of all floating equipment (towing equipment excepted) engaged in the work enumerated, including deck engines, except machinery manned by Operating Engineers.

The placing of all rip-rap, fill stone, bedding stone, cover stone and concrete blocks in connection with marine construction. Work normally performed by Employers, such as soil tests, shoring, underpinning of buildings, cribbing, driving of sheet piling, marine divers, tenders, underwater construction workers and similar operations shall continue to be included in the jurisdiction of this Agreement.

All burning, cutting, welding and fabrication of pipe, H-beams, sheet pile (metal or wood), done on the job site or in the yard of the Employer shall be done by pile drivers. The driving of bearing piles, sheet piling with heavy equipment, caissons, pile caps, auger drilling and boring, the setting up for load testing for any type of piling, all layout and spotting for piling, caisson and boring work, all earth retention, ditch boarding, installing tiebacks.

ASBESTOS ABATEMENT CARPENTERS

(gg) All erection and maintenance of barriers and partitions used in the removing of asbestos or any abatement work. The abatement of any materials previously installed by the carpenter such as transite, ceiling and floor tiles. All operating and maintaining of current equipment used in any abatement work.



STATE OF MICHIGAN
Informational Sheet: Prevailing Wages on State Projects

ELECTRICIAN – SOUND AND COMMUNICATION / DATA/ VOICE JURISDICTION

The installation, testing, service and maintenance, of systems which utilize the transmission and/or transference of voice, sound, vision or digital for commercial, education, security and entertainment purposes for the following: TV monitoring and surveillance, CATV and CCTV, background-foreground music, intercom and telephone interconnect, inventory control systems, microwave transmission, multi-media, multiplex, radio page, school intercom and sound, burglar alarms, low voltage fire alarm systems, low voltage master clock systems, distributed antenna systems (DAS), IP data networks, and all surface-mounted (non-power) telecommunications wiremold. Shall additionally include the installation of all raceway systems of unlimited length in telecommunications rooms, entrance facilities, equipment rooms, and similar areas. Energy management systems. Security systems; perimeter, vibration, card access, access control and sonar/infrared monitoring equipment. Communications systems that transmit or receive information and/or control systems that are intrinsic to the above listed systems; SCADA (Supervisory Control and Data Acquisition), PCM (Pulse Code Modulation), Digital Data Systems, Broadband and Baseband and Carriers, POS (Point of Sale systems), VSAT Data Systems, RF and Remote Control Systems, Fiber Optic Data Systems and Voice and Data Infrastructure and Backbone.



GRETCHEN WHITMER
GOVERNOR

STATE OF MICHIGAN
DEPARTMENT OF LABOR AND ECONOMIC OPPORTUNITY
WAGE AND HOUR DIVISION

SUSAN CORBIN
DIRECTOR

Prevailing Wage Rates for State Funded Projects Official Rate Schedule

| | |
|---|---|
| ORS#: | ORS-002118 |
| Date Issued: | 03/11/2025 |
| Contract Award By Date: | 06/09/2025 |
| Contracting Agency: | Warren Woods Public Schools (CA-0280) |
| Contracting Agency Representative: | Neil R. Cassabon (ncassabon@mywwps.org) |
| Project Number: | 242030 |
| Project Name: | Tower Titan Express Servery Remodel and Hawthorn F |
| Project Description: | Renovations to the Titan Express food service serving line in the high school cafeteria and replacement of the walk in freezer/cooler at the Hawthorn Education Center. |

FOR ALL AWARDED CONTRACTS ONLY

- Every Contractor and Subcontractors shall keep Posted on the Construction Site, in a conspicuous place, a copy of all applicable prevailing wage rate schedules contained in a contract.
- The Prevailing rate schedule provides an hourly rate which includes wage and fringe benefit totals for designated classifications.
- Please refer to WHD-9917 & WHD 9918 for any additional information.

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|---------------------|--------------------|-------------------|
| Boilermaker | Boilermaker | 05/10/2024 |

Classification Description: Boilermaker

| Wage Rates | Straight Time | Time and a Half | Double Time |
|------------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$72.47 | \$107.55 | \$142.63 |
| Apprentice: 1st Period | \$53.53 | \$79.15 | \$104.75 |
| Apprentice: 2nd Period | \$55.14 | \$81.56 | \$107.97 |
| Apprentice: 3rd Period | \$56.73 | \$83.94 | \$111.15 |
| Apprentice: 4th Period | \$58.31 | \$86.31 | \$114.31 |
| Apprentice: 5th Period | \$59.85 | \$88.62 | \$117.39 |
| Apprentice: 6th Period | \$63.03 | \$93.39 | \$123.75 |
| Apprentice: 7th Period | \$66.17 | \$98.10 | \$130.03 |
| Apprentice: 8th Period | \$69.32 | \$102.83 | \$136.33 |

Overtime Provisions

| Over 8-hour day/40-hour week | |
|-------------------------------------|----------|
| 9th hour | \$90.82 |
| 10th hour | \$90.82 |
| Beyond 10 hours | \$90.82 |
| Saturday | |
| First 8 hours | \$90.82 |
| 9th hour | \$90.82 |
| 10th hour | \$90.82 |
| Beyond 10 hours | \$90.82 |
| Sunday/Holiday | |
| | \$109.17 |

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|---|-------------------|-------------------|
| Bricklayers, Stone Mason, Pointer, Cleaner & Caulker - BAC 2 - Metro Detroit | Bricklayer | 09/24/2024 |

Classification Description: Bricklayers, Stone Mason, Pointer, Cleaner & Caulker

| Wage Rates | Straight Time | Time and a Half | Double Time |
|--|---------------|-----------------|-------------|
| Total Hourly Wage | \$65.01 | \$97.53 | \$130.02 |
| Apprentice: Bricklayer Apprentice Level 5 | \$52.46 | \$78.71 | \$104.92 |
| Apprentice: Bricklayer Apprentice Level 6 | \$54.31 | \$81.48 | \$108.62 |
| Apprentice: Bricklayers Apprentice 2nd Level | \$46.91 | \$70.38 | \$93.82 |
| Apprentice: Bricklayers Apprentice 4th Level | \$50.61 | \$75.93 | \$101.22 |
| Apprentice: Bricklayers Apprentice Level 1 | \$45.06 | \$67.61 | \$90.12 |
| Apprentice: Bricklayers Apprentice Level 3 | \$48.76 | \$73.16 | \$97.52 |
| Apprentice: Bricklayers Apprentice Level 7&8 | \$56.16 | \$84.26 | \$112.32 |

Overtime Provisions

| Over 8-hour day/40-hour week | |
|------------------------------|-----------------|
| 9th hour | \$65.01 |
| 10th hour | \$65.01 |
| Beyond 10 hours | \$65.01 |
| Saturday | |
| First 8 hours | \$65.01 |
| 9th hour | \$65.01 |
| 10th hour | \$65.01 |
| Beyond 10 hours | \$65.01 |
| Sunday/Holiday | \$130.02 |

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

Between Nov. 1 and Apr 30, if inclement weather, or other conditions beyond the Employer's control, Saturdays may be worked as make-up days. Make-up time shall be paid at the straight time rate until forty hrs are worked unless the standard workweek included a holiday, then 32 hrs straight time

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|------------------------------------|------------------|-------------------|
| Carpenter/Piledriver-687-Z1 | Carpenter | 09/16/2024 |

Classification Description: Carpenter/Piledriver

| Wage Rates | Straight Time | Time and a Half | Double Time |
|----------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$72.05 | \$92.86 | \$113.66 |
| Apprentice: 1st year | \$47.22 | \$59.81 | \$72.39 |
| Apprentice: 2nd year | \$53.43 | \$68.07 | \$82.71 |
| Apprentice: 3rd year | \$59.64 | \$76.34 | \$93.03 |
| Apprentice: 4th year | \$65.85 | \$84.60 | \$103.35 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|---------|
| 9th hour | \$92.86 |
| 10th hour | \$92.86 |
| Beyond 10 hours | \$92.86 |

Saturday

| | |
|-----------------|---------|
| First 8 hours | \$92.86 |
| 9th hour | \$92.86 |
| 10th hour | \$92.86 |
| Beyond 10 hours | \$92.86 |

| | |
|-----------------------|-----------------|
| Sunday/Holiday | \$113.66 |
|-----------------------|-----------------|

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

Yes, but Saturdays may not be used as a make-up day. One and a half (1 ½) the straight time rate applies to all Saturday hours, and those over 40 hours per week. Double time applies on all Sundays, Holidays, and all time over 12 hours per day.

Base Rate Comment: 4-10s allowed Mon-Sat

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|---|------------------|-------------------|
| Carpet & Resilient Floor Layer | Carpenter | 05/10/2024 |

Classification Description: Carpet and Resilient Floor Layer, (does not include installation of prefabricated formica & parquet flooring which is to be paid carpenter rate)

| Wage Rates | Straight Time | Time and a Half | Double Time |
|---------------------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$64.51 | \$82.93 | \$101.34 |
| Apprentice: Apprentice 1st Year | \$42.73 | \$53.88 | \$65.03 |
| Apprentice: Apprentice 2nd Year | \$48.17 | \$61.14 | \$74.10 |
| Apprentice: Apprentice 3rd Year | \$53.61 | \$68.39 | \$83.17 |
| Apprentice: Apprentice 4th Year | \$59.07 | \$75.67 | \$92.27 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|---------|
| 9th hour | \$64.51 |
| 10th hour | \$64.51 |
| Beyond 10 hours | \$82.92 |

Saturday

| | |
|-----------------|----------|
| First 8 hours | \$82.92 |
| 9th hour | \$82.92 |
| 10th hour | \$82.92 |
| Beyond 10 hours | \$101.34 |

| | |
|-----------------------|---------------|
| Sunday/Holiday | \$0.00 |
|-----------------------|---------------|

Four 10-hour days allowed? - No

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|----------------------------|------------------|-------------------|
| Diver Tender-687-Z1 | Carpenter | 09/16/2024 |

Classification Description: Journeyman-Diver Tender

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$71.16 | \$91.97 | \$112.77 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|---------|
| 9th hour | \$91.97 |
| 10th hour | \$91.97 |
| Beyond 10 hours | \$91.97 |

Saturday

| | |
|-----------------|---------|
| First 8 hours | \$91.97 |
| 9th hour | \$91.97 |
| 10th hour | \$91.97 |
| Beyond 10 hours | \$91.97 |

| | |
|-----------------------|-----------------|
| Sunday/Holiday | \$112.77 |
|-----------------------|-----------------|

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

Yes, but Saturdays may not be used as a make-up day. One and a half (1 ½) the straight time rate applies to all Saturday hours, and those over 40 hours per week. Double time applies on all Sundays, Holidays, and all time over 12 hours per day.

Overtime Rate Comment: Double time over 12 hours/day.

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|---------------------------------|------------------------|-------------------|
| Class A Laborer - Zone A | Class A Laborer | 05/10/2024 |

Classification Description: Construction Laborer, Demolition Laborer, Mason Tender, Carpenter Tender, Drywall Handler, Concrete Laborer, Cement Finisher tender, concrete chute and concrete Bucket Handler, Concrete Laborer, Cement Finisher Tender

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$50.10 | \$64.48 | \$78.85 |
| Apprentice: 0-1,000 Hours | \$42.91 | \$53.69 | \$64.47 |
| Apprentice: 1,001-2,000 Hours | \$44.35 | \$55.85 | \$67.35 |
| Apprentice: 2,001-3,000 Hours | \$45.79 | \$58.01 | \$70.23 |
| Apprentice: 3,001-4,000 Hours | \$48.66 | \$62.31 | \$75.97 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|---------|
| 9th hour | \$64.48 |
| 10th hour | \$64.48 |
| Beyond 10 hours | \$64.48 |

Saturday

| | |
|-----------------|---------|
| First 8 hours | \$64.48 |
| 9th hour | \$64.48 |
| 10th hour | \$64.48 |
| Beyond 10 hours | \$64.48 |

| | |
|-----------------------|----------------|
| Sunday/Holiday | \$78.85 |
|-----------------------|----------------|

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

Saturday

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|---------------------------------|---------------------------------|-------------------|
| Communication Technician | Communication Technician | 05/13/2024 |

Classification Description:

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$67.89 | \$98.24 | \$128.58 |

Overtime Provisions

| Over 8-hour day/40-hour week | |
|-------------------------------------|----------|
| 9th hour | \$98.24 |
| 10th hour | \$98.24 |
| Beyond 10 hours | \$98.24 |
| Saturday | |
| First 8 hours | \$98.24 |
| 9th hour | \$98.24 |
| 10th hour | \$98.24 |
| Beyond 10 hours | \$98.24 |
| Sunday/Holiday | |
| | \$128.58 |

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

ONLY due to inclement weather or customer requirements may Friday be used as a make up day if the normal scheduled work week was interrupted and time lost of five (5) hours or more was incurred by workmen covered under the terms of the 6-17-C/6-876-T agreement.

Base Rate Comment: Foreman (112.5% above JL Rate)

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|---------------------|--------------|-------------------|
| Diver-687-Z1 | Diver | 10/01/2024 |

Classification Description: Diver

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$82.48 | \$107.41 | \$132.34 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|----------|
| 9th hour | \$107.41 |
| 10th hour | \$107.41 |
| Beyond 10 hours | \$107.41 |

Saturday

| | |
|-----------------|----------|
| First 8 hours | \$107.41 |
| 9th hour | \$107.41 |
| 10th hour | \$107.41 |
| Beyond 10 hours | \$107.41 |

| | |
|-----------------------|-----------------|
| Sunday/Holiday | \$132.34 |
|-----------------------|-----------------|

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

Yes, but Saturdays may not be used as a make-up day. One and a half (1 ½) the straight time rate applies to all Saturday hours, and those over 40 hours per week. Double time applies on all Sundays, Holidays, and all time over 12 hours per day.

Overtime Rate Comment: Double time due when over 12 hours worked per day

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|----------------------|----------------|-------------------|
| Drywall Taper | Drywall | 05/10/2024 |

Classification Description: Drywall Taper
Four 10s allowed Monday-Thursday

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-----------------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$45.91 | \$59.74 | \$73.56 |
| Apprentice: 4th 6 months | \$41.76 | \$53.51 | \$65.26 |
| Apprentice: First 3 months | \$32.08 | \$38.99 | \$45.90 |
| Apprentice: Second 3 months | \$34.85 | \$43.14 | \$51.44 |
| Apprentice: Second 6 months | \$37.62 | \$47.30 | \$56.98 |
| Apprentice: Third 6 months | \$40.38 | \$51.44 | \$62.50 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|---------|
| 9th hour | \$59.74 |
| 10th hour | \$59.74 |
| Beyond 10 hours | \$73.56 |

Saturday

| | |
|-----------------|---------|
| First 8 hours | \$59.74 |
| 9th hour | \$73.56 |
| 10th hour | \$73.56 |
| Beyond 10 hours | \$73.56 |

| | |
|-----------------------|----------------|
| Sunday/Holiday | \$73.56 |
|-----------------------|----------------|

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

Friday make-up day for bad weather or holidays

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|----------------------------------|--------------------|-------------------|
| Journeyman Inside Wireman | Electrician | 02/26/2025 |

Classification Description: -Duties: Install, repair, and maintain electrical systems, install lighting, receptacles, and fixtures
 -Materials: Wire and electrical cable, Conduit, Lighting, receptacles, and fixtures
 -Equipment: pliers, screwdrivers, wire cutters, measuring tapes, drills, electric screw guns, and hydraulic benders, voltmeters and ammeters

| Wage Rates | Straight Time | Time and a Half | Double Time |
|------------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$75.36 | \$107.79 | \$140.22 |
| Apprentice: 1st Period | \$46.28 | \$61.78 | \$73.67 |
| Apprentice: 2nd Period | \$53.43 | \$70.24 | \$83.46 |
| Apprentice: 3rd Period | \$56.08 | \$74.22 | \$88.75 |
| Apprentice: 4th Period | \$58.71 | \$78.18 | \$94.03 |
| Apprentice: 5th Period | \$61.36 | \$82.14 | \$99.32 |
| Apprentice: 6th Period | \$66.64 | \$90.07 | \$109.89 |

Overtime Provisions

| Over 8-hour day/40-hour week | |
|-------------------------------------|----------|
| 9th hour | \$101.02 |
| 10th hour | \$101.02 |
| Beyond 10 hours | \$101.02 |
| Saturday | |
| First 8 hours | \$101.02 |
| 9th hour | \$101.02 |
| 10th hour | \$101.02 |
| Beyond 10 hours | \$101.02 |
| Sunday/Holiday | |
| | \$126.68 |

Four 10-hour days allowed? - No

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|--|--------------------|-------------------|
| Sound and Communication Installer | Electrician | 02/27/2025 |

Classification Description: Sound and Communication Installer

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-----------------------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$48.26 | \$64.55 | \$80.85 |
| Apprentice: Apprentice 1st Period | \$34.69 | \$43.65 | \$52.61 |
| Apprentice: Apprentice 2nd Period | \$36.32 | \$46.09 | \$55.87 |
| Apprentice: Apprentice 3rd Period | \$37.96 | \$48.56 | \$59.14 |
| Apprentice: Apprentice 4th Period | \$39.58 | \$51.00 | \$62.40 |
| Apprentice: Apprentice 5th Period | \$41.21 | \$53.44 | \$65.65 |
| Apprentice: Apprentice 6th Period | \$42.84 | \$55.88 | \$68.91 |

Overtime Provisions

| Over 8-hour day/40-hour week | |
|-------------------------------------|---------|
| 9th hour | \$64.08 |
| 10th hour | \$64.08 |
| Beyond 10 hours | \$64.08 |
| Saturday | |
| First 8 hours | \$64.08 |
| 9th hour | \$64.08 |
| 10th hour | \$64.08 |
| Beyond 10 hours | \$64.08 |
| Sunday/Holiday | |
| | \$79.90 |

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|---|--------------------|-------------------|
| Sound and Communication Technician | Electrician | 02/27/2025 |

Classification Description: Sound and Communication Technician

| Wage Rates | Straight Time | Time and a Half | Double Time |
|----------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$56.80 | \$77.37 | \$97.93 |
| Apprentice: Period 1 | \$34.18 | \$14.45 | \$14.67 |
| Apprentice: Period 2 | \$36.23 | \$15.13 | \$15.58 |
| Apprentice: Period 3 | \$38.27 | \$14.58 | \$14.85 |
| Apprentice: Period 4 | \$40.31 | \$14.66 | \$14.95 |
| Apprentice: Period 5 | \$42.35 | \$14.71 | \$15.03 |
| Apprentice: Period 6 | \$44.40 | \$14.79 | \$15.13 |

Overtime Provisions

| Over 8-hour day/40-hour week | |
|-------------------------------------|---------|
| 9th hour | \$76.77 |
| 10th hour | \$76.77 |
| Beyond 10 hours | \$76.77 |
| Saturday | |
| First 8 hours | \$76.77 |
| 9th hour | \$76.77 |
| 10th hour | \$76.77 |
| Beyond 10 hours | \$76.77 |
| Sunday/Holiday | |
| | \$96.73 |

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|--------------------------------------|-----------------------------|-------------------|
| Elevator Constructor Mechanic | Elevator Constructor | 05/10/2024 |

Classification Description: Elevator Constructor Mechanic

| Wage Rates | Straight Time | Time and a Half | Double Time |
|---------------------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$96.27 | \$124.00 | \$151.73 |
| Apprentice: 1st Year Apprentice | \$70.42 | \$85.67 | \$100.92 |
| Apprentice: 2nd Year Apprentice | \$75.97 | \$94.00 | \$112.02 |
| Apprentice: 3rd Year Apprentice | \$78.74 | \$98.15 | \$117.56 |
| Apprentice: 4th Year Apprentice | \$84.29 | \$106.48 | \$128.66 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|----------|
| 9th hour | \$151.73 |
| 10th hour | \$151.73 |
| Beyond 10 hours | \$151.73 |

Saturday

| | |
|-----------------|----------|
| First 8 hours | \$151.73 |
| 9th hour | \$151.73 |
| 10th hour | \$151.73 |
| Beyond 10 hours | \$151.73 |

Sunday/Holiday

| | |
|--|----------|
| | \$151.73 |
|--|----------|

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|----------------------------|----------------------------|-------------------|
| Fiber Optic Splicer | Fiber Optic Splicer | 05/13/2024 |

Classification Description:

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$67.89 | \$98.24 | \$128.58 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|---------|
| 9th hour | \$98.24 |
| 10th hour | \$98.24 |
| Beyond 10 hours | \$98.24 |

Saturday

| | |
|-----------------|---------|
| First 8 hours | \$98.24 |
| 9th hour | \$98.24 |
| 10th hour | \$98.24 |
| Beyond 10 hours | \$98.24 |

| | |
|-----------------------|-----------------|
| Sunday/Holiday | \$128.58 |
|-----------------------|-----------------|

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

ONLY due to inclement weather or customer requirements may Friday be used as a make up day if the normal scheduled work week was interrupted and time lost of five (5) hours or more was incurred by workmen covered under the terms of the 6-17-C/6-876-T agreement.

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|---------------------|----------------|-------------------|
| Glazier | Glazier | 05/10/2024 |

Classification Description: Glazier

If 4 10 hour day workweek is scheduled, four 10s must be consecutive, M-F.

| Wage Rates | Straight Time | Time and a Half | Double Time |
|--------------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$53.55 | \$70.10 | \$86.65 |
| Apprentice: 1st 6 months | \$37.00 | \$45.27 | \$53.55 |
| Apprentice: 2nd 6 months | \$37.75 | \$46.40 | \$55.05 |
| Apprentice: 3rd 6 months | \$41.97 | \$52.73 | \$63.49 |
| Apprentice: 4th 6 months | \$43.62 | \$55.21 | \$66.79 |
| Apprentice: 5th 6 months | \$45.27 | \$57.68 | \$70.09 |
| Apprentice: 6th 6 months | \$46.93 | \$60.17 | \$73.41 |
| Apprentice: 7th 6 months | \$48.59 | \$62.66 | \$76.73 |
| Apprentice: 8th 6 months | \$51.89 | \$67.61 | \$83.33 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|---------|
| 9th hour | \$70.10 |
| 10th hour | \$70.10 |
| Beyond 10 hours | \$70.10 |

Saturday

| | |
|-----------------|---------|
| First 8 hours | \$70.10 |
| 9th hour | \$70.10 |
| 10th hour | \$70.10 |
| Beyond 10 hours | \$70.10 |

| | |
|-----------------------|----------------|
| Sunday/Holiday | \$86.65 |
|-----------------------|----------------|

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|--|---------------------------------|-------------------|
| Heat & Frost Insulator - Spray Insulation | Heat and Frost Insulator | 05/10/2024 |

Classification Description: Spray Insulation

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$25.29 | \$36.51 | \$47.73 |

Overtime Provisions

| Over 8-hour day/40-hour week | |
|-------------------------------------|---------|
| 9th hour | \$36.51 |
| 10th hour | \$36.51 |
| Beyond 10 hours | \$36.51 |
| Saturday | |
| First 8 hours | \$36.51 |
| 9th hour | \$36.51 |
| 10th hour | \$36.51 |
| Beyond 10 hours | \$36.51 |
| Sunday/Holiday | |
| | \$36.51 |

Four 10-hour days allowed? - No

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|--|---------------------------------|-------------------|
| Heat & Frost Insulator Asbestos | Heat and Frost Insulator | 05/10/2024 |

Classification Description: Heat and Frost Insulators and Asbestos Workers 4-10s must be worked a minimum of 2 weeks consecutively, Monday thru Thursday. Hours worked in excess of 10 will be paid at double time. Hours worked on the fifth day, Monday thru Friday @ time and half

| Wage Rates | Straight Time | Time and a Half | Double Time |
|----------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$62.65 | \$78.41 | \$94.16 |
| Apprentice: 1st Year | \$46.90 | \$54.78 | \$62.66 |
| Apprentice: 2nd Year | \$50.05 | \$59.50 | \$68.96 |
| Apprentice: 3rd Year | \$53.20 | \$64.23 | \$75.26 |
| Apprentice: 4th Year | \$56.35 | \$68.96 | \$81.56 |

Overtime Provisions

| Over 8-hour day/40-hour week | |
|-------------------------------------|---------|
| 9th hour | \$78.41 |
| 10th hour | \$78.41 |
| Beyond 10 hours | \$78.41 |
| Saturday | |
| First 8 hours | \$78.41 |
| 9th hour | \$78.41 |
| 10th hour | \$78.41 |
| Beyond 10 hours | \$78.41 |
| Sunday/Holiday | |
| | \$94.16 |

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|--|-------------------|-------------------|
| Ironworker - Rigger Machinery Mover | Ironworker | 01/07/2025 |

Classification Description: Rigging Work

| Wage Rates | Straight Time | Time and a Half | Double Time |
|---------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$78.78 | \$96.21 | \$113.63 |
| Apprentice: Level 1 | \$54.18 | \$65.03 | \$75.87 |
| Apprentice: Level 2 | \$54.18 | \$65.03 | \$75.87 |
| Apprentice: Level 3 | \$57.29 | \$69.02 | \$80.75 |
| Apprentice: Level 4 | \$60.00 | \$72.45 | \$84.89 |
| Apprentice: Level 5 | \$63.12 | \$76.45 | \$89.78 |
| Apprentice: Level 6 | \$65.82 | \$79.86 | \$93.90 |
| Apprentice: Level 7 | \$68.94 | \$83.87 | \$98.80 |
| Apprentice: Level 8 | \$72.05 | \$87.87 | \$103.69 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|----------|
| 9th hour | \$96.21 |
| 10th hour | \$96.21 |
| Beyond 10 hours | \$113.63 |

Saturday

| | |
|-----------------|----------|
| First 8 hours | \$96.21 |
| 9th hour | \$96.21 |
| 10th hour | \$96.21 |
| Beyond 10 hours | \$113.63 |

| | |
|-----------------------|-----------------|
| Sunday/Holiday | \$113.63 |
|-----------------------|-----------------|

Four 10-hour days allowed? - No

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|------------------------------|-------------------|-------------------|
| Reinforced Ironworker | Ironworker | 01/07/2025 |

Classification Description: Reinforced Iron Work

| Wage Rates | Straight Time | Time and a Half | Double Time |
|---------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$65.70 | \$82.42 | \$99.13 |
| Apprentice: Level 1 | \$54.67 | \$66.54 | \$78.41 |
| Apprentice: Level 2 | \$57.24 | \$69.61 | \$81.98 |
| Apprentice: Level 3 | \$59.13 | \$71.84 | \$84.54 |
| Apprentice: Level 4 | \$62.02 | \$75.56 | \$89.10 |
| Apprentice: Level 5 | \$64.92 | \$79.30 | \$93.67 |
| Apprentice: Level 6 | \$72.26 | \$88.98 | \$105.69 |
| Apprentice: Level 7 | \$72.26 | \$88.98 | \$105.69 |
| Apprentice: Level 8 | \$72.26 | \$88.98 | \$105.69 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|---------|
| 9th hour | \$82.41 |
| 10th hour | \$82.41 |
| Beyond 10 hours | \$99.13 |

Saturday

| | |
|-----------------|---------|
| First 8 hours | \$82.41 |
| 9th hour | \$82.41 |
| 10th hour | \$82.41 |
| Beyond 10 hours | \$99.13 |

| | |
|-----------------------|----------------|
| Sunday/Holiday | \$99.13 |
|-----------------------|----------------|

Four 10-hour days allowed? - No

Make Up Day Allowed? - Yes

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|------------------------------|-------------------|-------------------|
| Structural Ironworker | Ironworker | 01/07/2025 |

Classification Description: Structural, ornamental, welder and pre-cast

| Wage Rates | Straight Time | Time and a Half | Double Time |
|---------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$78.91 | \$105.80 | \$132.69 |
| Apprentice: Level 1 | \$54.18 | \$65.03 | \$75.87 |
| Apprentice: Level 2 | \$55.00 | \$66.20 | \$77.40 |
| Apprentice: Level 3 | \$57.29 | \$69.02 | \$80.75 |
| Apprentice: Level 4 | \$60.00 | \$72.45 | \$84.89 |
| Apprentice: Level 5 | \$63.12 | \$76.45 | \$89.78 |
| Apprentice: Level 6 | \$65.82 | \$79.86 | \$93.90 |
| Apprentice: Level 7 | \$68.94 | \$83.87 | \$98.80 |
| Apprentice: Level 8 | \$72.05 | \$87.87 | \$103.69 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|----------|
| 9th hour | \$96.69 |
| 10th hour | \$96.69 |
| Beyond 10 hours | \$114.46 |

Saturday

| | |
|-----------------|----------|
| First 8 hours | \$96.69 |
| 9th hour | \$96.69 |
| 10th hour | \$96.69 |
| Beyond 10 hours | \$114.46 |

Sunday/Holiday \$114.46

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

Friday

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|-------------------------------------|-------------------------------------|-------------------|
| Journeyman Signal Technician | Journeyman Signal Technician | 05/13/2024 |

Classification Description:

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$67.89 | \$98.24 | \$128.58 |
| Apprentice: Apprentice 1st 6 months | \$43.61 | \$61.82 | \$80.02 |
| Apprentice: Apprentice 2nd 6 months | \$46.65 | \$66.38 | \$86.10 |
| Apprentice: Apprentice 3rd 6 months | \$49.68 | \$70.92 | \$92.16 |
| Apprentice: Apprentice 4th 6 months | \$52.71 | \$75.47 | \$98.22 |
| Apprentice: Apprentice 5th 6 months | \$55.75 | \$80.03 | \$104.30 |
| Apprentice: Apprentice 6th 6months | \$61.82 | \$89.13 | \$116.44 |

Overtime Provisions

| Over 8-hour day/40-hour week | |
|-------------------------------------|----------|
| 9th hour | \$98.24 |
| 10th hour | \$98.24 |
| Beyond 10 hours | \$98.24 |
| Saturday | |
| First 8 hours | \$98.24 |
| 9th hour | \$98.24 |
| 10th hour | \$98.24 |
| Beyond 10 hours | \$98.24 |
| Sunday/Holiday | |
| | \$128.58 |

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

ONLY due to inclement weather or customer requirements may Friday be used as a make up day if the normal scheduled work week was interrupted and time lost of five (5) hours or more was incurred by workmen covered under the terms of the 6-17-C/6-876-T agreement.

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|------------------------------|------------------------------|-------------------|
| Journeyman Specialist | Journeyman Specialist | 05/13/2024 |

Classification Description:

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$76.98 | \$111.88 | \$146.76 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|----------|
| 9th hour | \$111.87 |
| 10th hour | \$111.87 |
| Beyond 10 hours | \$111.87 |

Saturday

| | |
|-----------------|----------|
| First 8 hours | \$111.87 |
| 9th hour | \$111.87 |
| 10th hour | \$111.87 |
| Beyond 10 hours | \$111.87 |

| | |
|-----------------------|-----------------|
| Sunday/Holiday | \$146.76 |
|-----------------------|-----------------|

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

ONLY due to inclement weather or customer requirements may Friday be used as a make up day if the normal scheduled work week was interrupted and time lost of five (5) hours or more was incurred by workmen covered under the terms of the 6-17-C/6-876-T agreement.

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|---------------------------|---------------------------|-------------------|
| Labor Crew Foreman | Labor Crew Foreman | 05/13/2024 |

Classification Description:

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$61.86 | \$89.19 | \$116.52 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|---------|
| 9th hour | \$89.19 |
| 10th hour | \$89.19 |
| Beyond 10 hours | \$89.19 |

Saturday

| | |
|-----------------|---------|
| First 8 hours | \$89.19 |
| 9th hour | \$89.19 |
| 10th hour | \$89.19 |
| Beyond 10 hours | \$89.19 |

| | |
|-----------------------|-----------------|
| Sunday/Holiday | \$116.52 |
|-----------------------|-----------------|

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

ONLY due to inclement weather or customer requirements may Friday be used as a make up day if the normal scheduled work week was interrupted and time lost of five (5) hours or more was incurred by workmen covered under the terms of the 6-17-C/6-876-T agreement.

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|--|----------------|-------------------|
| Asbestos & Lead Abatement Laborer | Laborer | 05/10/2024 |

Classification Description: Asbestos & Lead Abatement Laborer

4 ten hour days @ straight time allowed Monday-Saturday, must be consecutive calendar days

| Wage Rates | Straight Time | Time and a Half | Double Time |
|---------------------------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$50.60 | \$65.37 | \$80.13 |
| Apprentice: Trainee 600 hours +1 year | \$34.07 | \$18.89 | \$20.54 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|---------|
| 9th hour | \$65.37 |
| 10th hour | \$65.37 |
| Beyond 10 hours | \$65.37 |

Saturday

| | |
|-----------------|---------|
| First 8 hours | \$65.37 |
| 9th hour | \$65.37 |
| 10th hour | \$65.37 |
| Beyond 10 hours | \$65.37 |

| | |
|-----------------------|----------------|
| Sunday/Holiday | \$80.13 |
|-----------------------|----------------|

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|----------------------|----------------|-------------------|
| Ground Burner | Laborer | 08/02/2024 |

Classification Description: Ground Burner

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$45.03 | \$60.70 | \$76.36 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|---------|
| 9th hour | \$60.69 |
| 10th hour | \$60.69 |
| Beyond 10 hours | \$60.69 |

Saturday

| | |
|-----------------|---------|
| First 8 hours | \$60.69 |
| 9th hour | \$45.03 |
| 10th hour | \$45.03 |
| Beyond 10 hours | \$45.03 |

| | |
|-----------------------|----------------|
| Sunday/Holiday | \$76.36 |
|-----------------------|----------------|

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|---------------------|----------------|-------------------|
| High Burner | Laborer | 08/02/2024 |

Classification Description: High Burner

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$51.83 | \$68.65 | \$85.46 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|---------|
| 9th hour | \$68.65 |
| 10th hour | \$68.65 |
| Beyond 10 hours | \$68.65 |

Saturday

| | |
|-----------------|---------|
| First 8 hours | \$68.65 |
| 9th hour | \$68.65 |
| 10th hour | \$68.65 |
| Beyond 10 hours | \$68.65 |

| | |
|-----------------------|----------------|
| Sunday/Holiday | \$85.46 |
|-----------------------|----------------|

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

Saturday

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|----------------------|----------------|-------------------|
| Laborer - A-B | Laborer | 05/10/2024 |

Classification Description: Signal man (on sewer & caisson work); air,electric or gasoline tool operator (including concrete vibrator operator,acetylene torch & air hammer operator); scaffold builder, caisson worker

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$50.40 | \$64.93 | \$79.45 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|---------|
| 9th hour | \$64.93 |
| 10th hour | \$64.93 |
| Beyond 10 hours | \$64.93 |

Saturday

| | |
|-----------------|---------|
| First 8 hours | \$64.93 |
| 9th hour | \$64.93 |
| 10th hour | \$64.93 |
| Beyond 10 hours | \$64.93 |

| | |
|-----------------------|----------------|
| Sunday/Holiday | \$79.45 |
|-----------------------|----------------|

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

Saturday

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|----------------------|----------------|-------------------|
| Laborer - A-C | Laborer | 05/10/2024 |

Classification Description: Lansing Burner, Blaster & Powder Man; Air, electric Gasoline Tool Operator (Blast furnace work or battery work)

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$50.96 | \$65.77 | \$80.57 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|---------|
| 9th hour | \$65.77 |
| 10th hour | \$65.77 |
| Beyond 10 hours | \$65.77 |

Saturday

| | |
|-----------------|---------|
| First 8 hours | \$65.77 |
| 9th hour | \$65.77 |
| 10th hour | \$65.77 |
| Beyond 10 hours | \$65.77 |

| | |
|-----------------------|----------------|
| Sunday/Holiday | \$80.57 |
|-----------------------|----------------|

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

Saturday,

If conditions beyond the employer/employee's control prevent one or more hours of working during Mon-Fri, the employer may choose to work up to 10 hour straight time weekdays.

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|----------------------|----------------|-------------------|
| Laborer - A-D | Laborer | 05/10/2024 |

Classification Description: Furnance battery heater tender, burning bar & oxy-acetylene gun

| Wage Rates | Straight Time | Time and a Half | Double Time | Overtime Provisions |
|-------------------|---------------|-----------------|-------------|-------------------------------------|
| Total Hourly Wage | \$50.67 | \$65.33 | \$79.99 | Over 8-hour day/40-hour week |
| | | | | 9th hour \$65.33 |
| | | | | 10th hour \$65.33 |
| | | | | Beyond 10 hours \$65.33 |
| | | | | Saturday |
| | | | | First 8 hours \$65.33 |
| | | | | 9th hour \$65.33 |
| | | | | 10th hour \$65.33 |
| | | | | Beyond 10 hours \$65.33 |
| | | | | Sunday/Holiday \$79.99 |

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

Saturday

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|----------------------|----------------|-------------------|
| Laborer - A-E | Laborer | 05/10/2024 |

Classification Description: Cleaner/sweeper laborer, furniture laborer

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$44.65 | \$56.30 | \$67.95 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|---------|
| 9th hour | \$56.30 |
| 10th hour | \$56.30 |
| Beyond 10 hours | \$56.30 |

Saturday

| | |
|-----------------|---------|
| First 8 hours | \$56.30 |
| 9th hour | \$56.30 |
| 10th hour | \$56.30 |
| Beyond 10 hours | \$56.30 |

| | |
|-----------------------|----------------|
| Sunday/Holiday | \$67.95 |
|-----------------------|----------------|

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

Saturday

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|----------------------|----------------|-------------------|
| Laborer - A-F | Laborer | 05/10/2024 |

Classification Description: Expediter man, topman and/or bottom man (blast furnace work or battery work)

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$51.51 | \$66.69 | \$81.87 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|---------|
| 9th hour | \$66.59 |
| 10th hour | \$66.59 |
| Beyond 10 hours | \$66.59 |

Saturday

| | |
|-----------------|---------|
| First 8 hours | \$66.59 |
| 9th hour | \$66.59 |
| 10th hour | \$66.59 |
| Beyond 10 hours | \$66.59 |

| | |
|-----------------------|----------------|
| Sunday/Holiday | \$81.67 |
|-----------------------|----------------|

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|----------------------|----------------|-------------------|
| Laborer - A-W | Laborer | 05/10/2024 |

Classification Description: Laborer -Wall and ceiling material handler, plasterer tender, mortar mixer and plastering machine operator

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$46.90 | \$59.78 | \$72.65 |
| Apprentice: 0-1,000 Hours | \$40.46 | \$55.20 | \$69.93 |
| Apprentice: 1,001-2,000 Hours | \$41.75 | \$57.13 | \$72.50 |
| Apprentice: 2,001-3,000 Hours | \$43.04 | \$59.06 | \$75.08 |
| Apprentice: 3,001-4,000 Hours | \$45.61 | \$62.92 | \$80.23 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|---------|
| 9th hour | \$59.78 |
| 10th hour | \$59.78 |
| Beyond 10 hours | \$59.78 |

Saturday

| | |
|-----------------|---------|
| First 8 hours | \$59.78 |
| 9th hour | \$59.78 |
| 10th hour | \$59.78 |
| Beyond 10 hours | \$59.78 |

Sunday/Holiday \$72.65

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

Saturday make up day due to conditions beyond control or holiday

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|--------------------------------|----------------|-------------------|
| Laborer - Class 1 - RZ1 | Laborer | 06/20/2024 |

Classification Description: Laborer Road Class 1: Asphalt Shoveler or loader, asphalt plant misc., asphalt raker tender, burlap man, carpenters' tender, yard man, guard rail builder's tender, Earth Retention barrier and wall and M.S.E. Wall installers Tender, Highway and median barrier installers tender (including sound, retaining and crash barriers), fence erector's tender, dumper (wagon, Truck, etc.), joint filling labor, misc., unskilled labor, sprinkler labor, form setting labor, form stripper, pavement reinforcing, handling and placing (e.g., wire mesh, steel mats, dowel bars, etc.), mason's or bricklayer's tender on manholes, manhole builder, headwalls, etc., waterproofing, (other than buildings) seal coating and slurry mix, shoring, underpinning, bridge painting, etc., (spray, roller and brush), sandblasting, pressure grouting, bridge pin and hanger removal, Material Recycling Laborer, Horizontal Paver Laborer (brick, concrete, clay, stone and asphalt), Ground Stabilization and Modification Laborer, grouting, waterblasting, Top Man, and railroad track and trestle laborer, sign installer and remote control operated equipment.

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$47.82 | \$62.33 | \$76.83 |
| Apprentice: 0-1,000 hours | \$41.33 | \$52.21 | \$63.09 |
| Apprentice: 1,001-2,000 hours | \$42.78 | \$54.39 | \$65.99 |
| Apprentice: 2,001-3,000 | \$44.23 | \$56.56 | \$68.89 |
| Apprentice: 3,001-4,000 hours | \$47.13 | \$60.91 | \$74.69 |

Overtime Provisions

| Over 8-hour day/40-hour week | |
|-------------------------------------|---------|
| 9th hour | \$62.33 |
| 10th hour | \$62.33 |
| Beyond 10 hours | \$62.33 |
| Saturday | |
| First 8 hours | \$62.33 |
| 9th hour | \$62.33 |
| 10th hour | \$62.33 |
| Beyond 10 hours | \$62.33 |
| Sunday/Holiday | |
| | \$76.83 |

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|--------------------------------|----------------|-------------------|
| Laborer - Class 2 - RZ1 | Laborer | 06/20/2024 |

Classification Description: Laborer Road Class 2: Mixer operator, (less than 5 sacks), air or electric tool operator (jack hammer, etc.), spreader, boxman (asphalt, stone, gravel, etc.), concrete paddler, power chain saw operator, paving batch truck dumper, tunnel mucker (highway work only), concrete saw operator (under 40 hp), dry pack machine, and roto-mill grounds person.

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$48.07 | \$62.64 | \$77.21 |
| Apprentice: 0-1,000 hours | \$41.43 | \$52.36 | \$63.29 |
| Apprentice: 1,001-2,000 hours | \$42.88 | \$54.54 | \$66.19 |
| Apprentice: 2,001-3,000 hours | \$44.34 | \$56.73 | \$69.11 |
| Apprentice: 3,001-4,000 hours | \$47.25 | \$61.09 | \$74.93 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|---------|
| 9th hour | \$62.64 |
| 10th hour | \$62.64 |
| Beyond 10 hours | \$62.64 |

Saturday

| | |
|-----------------|---------|
| First 8 hours | \$62.64 |
| 9th hour | \$62.64 |
| 10th hour | \$62.64 |
| Beyond 10 hours | \$62.64 |

| | |
|-----------------------|----------------|
| Sunday/Holiday | \$77.21 |
|-----------------------|----------------|

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|--------------------------------|----------------|-------------------|
| Laborer - Class 3 - RZ1 | Laborer | 06/20/2024 |

Classification Description: Laborer Road Class 3: Tunnel miner (highway work only), finishers tenders, guard rail builder, highway and median barrier installer, Earth Retention Barrier and wall and M.S.E. wall installer (including sound, retaining and crash barriers), fence erector, bottom man, powder man, wagon drill, and air track operator, curb and side rail setter's tender, diamond and core drills (per agreement between the Laborers and Operating Engineers International Union dated February 3, 1954), grade checker and certified welder.

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$48.25 | \$62.91 | \$77.57 |
| Apprentice: 0-1,000 hours | \$41.56 | \$52.55 | \$63.55 |
| Apprentice: 1,001-2,000 hours | \$43.03 | \$54.76 | \$66.49 |
| Apprentice: 2,001-3,000 hours | \$44.49 | \$56.95 | \$69.41 |
| Apprentice: 3,001-4,000 hours | \$47.42 | \$61.35 | \$75.27 |

Overtime Provisions

| Over 8-hour day/40-hour week | |
|-------------------------------------|---------|
| 9th hour | \$62.91 |
| 10th hour | \$62.91 |
| Beyond 10 hours | \$62.91 |
| Saturday | |
| First 8 hours | \$62.91 |
| 9th hour | \$62.91 |
| 10th hour | \$62.91 |
| Beyond 10 hours | \$62.91 |
| Sunday/Holiday | |
| | \$77.57 |

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|--------------------------------|----------------|-------------------|
| Laborer - Class 4 - RZ1 | Laborer | 05/10/2024 |

Classification Description: Laborer Road Class 4: asphalt raker

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$48.33 | \$62.53 | \$77.23 |
| Apprentice: 0-1,000 hours | \$41.62 | \$52.15 | \$63.17 |
| Apprentice: 1,001-2,000 hours | \$43.09 | \$54.35 | \$66.11 |
| Apprentice: 2,001-3,000 hours | \$44.56 | \$56.55 | \$69.05 |
| Apprentice: 3,001-4,000 hours | \$47.50 | \$60.97 | \$74.93 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|---------|
| 9th hour | \$63.03 |
| 10th hour | \$63.03 |
| Beyond 10 hours | \$63.03 |

Saturday

| | |
|-----------------|---------|
| First 8 hours | \$63.03 |
| 9th hour | \$63.03 |
| 10th hour | \$63.03 |
| Beyond 10 hours | \$63.03 |

| | |
|-----------------------|----------------|
| Sunday/Holiday | \$77.73 |
|-----------------------|----------------|

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|--------------------------------|----------------|-------------------|
| Laborer - Class 5 - RZ1 | Laborer | 05/10/2024 |

Classification Description: Laborer Road Class 5: pipe layers, oxy-gun

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$48.54 | \$63.35 | \$78.15 |
| Apprentice: 0-1,000 hours | \$41.78 | \$52.89 | \$63.99 |
| Apprentice: 1,001-2,000 hours | \$43.26 | \$55.11 | \$66.95 |
| Apprentice: 2,001-3,000 hours | \$44.74 | \$57.33 | \$69.91 |
| Apprentice: 3,001-4,000 hours | \$47.70 | \$61.77 | \$75.83 |

Overtime Provisions

| Over 8-hour day/40-hour week | |
|-------------------------------------|---------|
| 9th hour | \$63.34 |
| 10th hour | \$63.34 |
| Beyond 10 hours | \$63.34 |
| Saturday | |
| First 8 hours | \$63.34 |
| 9th hour | \$63.34 |
| 10th hour | \$63.34 |
| Beyond 10 hours | \$63.34 |
| Sunday/Holiday | |
| | \$78.15 |

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|--------------------------------|----------------|-------------------|
| Laborer - Class 6 - RZ1 | Laborer | 05/10/2024 |

Classification Description: Laborer Road Class 6: line form setter for curb or pavement, asphalt screed checker/screw man on asphalt paving machines

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$48.84 | \$63.80 | \$78.75 |
| Apprentice: 0-1,000 hours | \$42.00 | \$53.22 | \$64.43 |
| Apprentice: 1,001-2,000 hours | \$43.50 | \$55.47 | \$67.43 |
| Apprentice: 2,001-3,000 hours | \$44.99 | \$57.70 | \$70.41 |
| Apprentice: 3,001-4,000 hours | \$47.98 | \$62.19 | \$76.39 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|---------|
| 9th hour | \$63.80 |
| 10th hour | \$63.80 |
| Beyond 10 hours | \$63.80 |

Saturday

| | |
|-----------------|---------|
| First 8 hours | \$63.80 |
| 9th hour | \$63.80 |
| 10th hour | \$63.80 |
| Beyond 10 hours | \$63.80 |

| | |
|-----------------------|----------------|
| Sunday/Holiday | \$78.75 |
|-----------------------|----------------|

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|--------------------------------|----------------|-------------------|
| Laborer - Class 7 - RZ1 | Laborer | 06/20/2024 |

Classification Description: Laborer Road Class 7: Concrete Specialist - The Classification of Concrete Specialist shall include the finishing and troweling, of cast in place or precast concrete by any and all methods. Laborers who have the necessary skills to be classified as a Concrete Specialist and perform the work shall be paid the following wage and fringe benefit scale.

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$49.91 | \$65.40 | \$80.89 |
| Apprentice: 0-1,000 hours | \$42.80 | \$54.42 | \$66.03 |
| Apprentice: 1,001-2,000 hours | \$44.35 | \$56.74 | \$69.13 |
| Apprentice: 2,001-3,000 hours | \$45.90 | \$59.06 | \$72.23 |
| Apprentice: 3,001-4,000 hours | \$47.78 | \$64.72 | \$81.66 |

Overtime Provisions

| Over 8-hour day/40-hour week | |
|-------------------------------------|---------|
| 9th hour | \$65.40 |
| 10th hour | \$65.40 |
| Beyond 10 hours | \$65.40 |
| Saturday | |
| First 8 hours | \$65.40 |
| 9th hour | \$65.40 |
| 10th hour | \$65.40 |
| Beyond 10 hours | \$65.40 |
| Sunday/Holiday | |
| | \$80.89 |

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|---|----------------------------|-------------------|
| Laborer - Hazardous - Class A - Z1 | Laborer - Hazardous | 05/10/2024 |

Classification Description: Class A performing work in conjunction with site preparation and other preliminary work prior to actual removal, handling, or containment of hazardous waste substances not requiring use of personal protective equipment required by state or federal regulat

| Wage Rates | Straight Time | Time and a Half | Double Time |
|------------------------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$46.90 | \$64.85 | \$82.80 |
| Apprentice: 0-1,000 work hours | \$40.46 | \$55.19 | \$69.92 |
| Apprentice: 1,001-2,000 work hours | \$41.75 | \$57.13 | \$72.50 |
| Apprentice: 2,001-3,000 work hours | \$43.04 | \$59.07 | \$75.08 |
| Apprentice: 3,001-4,000 work hours | \$45.61 | \$62.92 | \$80.22 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|---------|
| 9th hour | \$59.78 |
| 10th hour | \$59.78 |
| Beyond 10 hours | \$59.78 |

Saturday

| | |
|-----------------|---------|
| First 8 hours | \$59.78 |
| 9th hour | \$59.78 |
| 10th hour | \$59.78 |
| Beyond 10 hours | \$59.78 |

| | |
|-----------------------|----------------|
| Sunday/Holiday | \$72.65 |
|-----------------------|----------------|

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

4 10s allowed M-Th or T-F; inclement weather makeup day Friday

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|---|----------------------------|-------------------|
| Laborer - Hazardous - Class B - Z1 | Laborer - Hazardous | 05/10/2024 |

Classification Description: Class B performing work in conjunction with the removal, handling, or containment of hazardous waste substances when the use of personal protective equipment levels "A", "B" or "C" is required.

| Wage Rates | Straight Time | Time and a Half | Double Time |
|------------------------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$47.90 | \$66.35 | \$84.80 |
| Apprentice: 0-1,000 work hours | \$41.21 | \$56.32 | \$71.42 |
| Apprentice: 1,001-2,000 work hours | \$42.55 | \$58.33 | \$74.10 |
| Apprentice: 2,001-3,000 work hours | \$43.89 | \$60.34 | \$76.78 |
| Apprentice: 3,001-4,000 work hours | \$46.56 | \$64.35 | \$82.12 |

| Overtime Provisions | |
|-------------------------------------|---------|
| Over 8-hour day/40-hour week | |
| 9th hour | \$61.28 |
| 10th hour | \$61.28 |
| Beyond 10 hours | \$61.28 |
| Saturday | |
| First 8 hours | \$61.28 |
| 9th hour | \$61.28 |
| 10th hour | \$61.28 |
| Beyond 10 hours | \$61.28 |
| Sunday/Holiday | \$74.65 |

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

4 10s allowed M-Th or T-F; inclement weather makeup day Friday

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|---------------------|----------------------------|-------------------|
| Class A | Laborer - Landscape | 08/02/2024 |

Classification Description: Irrigation Foremen and Construction Foremen. Skilled Landscape Operator includes air, gas and diesel equipment operators, lawn sprinkler installers, skid steer/track loaders, mini excavators, off-road dump vehicle, articulated haulers, hydroseeder, backhoe loaders, wheel loaders, excavators, ride and walk-behind trenchers and telescope handlers.

| Wage Rates | Straight Time | Time and a Half | Double Time | Overtime Provisions |
|-------------------|---------------|-----------------|-------------|-------------------------------------|
| Total Hourly Wage | \$37.22 | \$50.00 | \$62.78 | Over 8-hour day/40-hour week |
| | | | | 9th hour \$37.22 |
| | | | | 10th hour \$37.22 |
| | | | | Beyond 10 hours \$37.22 |
| | | | | Saturday |
| | | | | First 8 hours \$37.22 |
| | | | | 9th hour \$37.22 |
| | | | | 10th hour \$37.22 |
| | | | | Beyond 10 hours \$37.22 |
| | | | | Sunday/Holiday \$37.22 |

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|---------------------|----------------------------|-------------------|
| Class B | Laborer - Landscape | 08/02/2024 |

Classification Description: Skilled Landscape Laborer includes small power tool operator, lawn sprinkler installers' tender, irrigation installers' tender and material mover.

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$35.00 | \$48.17 | \$61.34 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|---------|
| 9th hour | \$35.00 |
| 10th hour | \$35.00 |
| Beyond 10 hours | \$35.00 |

Saturday

| | |
|-----------------|---------|
| First 8 hours | \$35.00 |
| 9th hour | \$35.00 |
| 10th hour | \$35.00 |
| Beyond 10 hours | \$35.00 |

| | |
|-----------------------|----------------|
| Sunday/Holiday | \$35.00 |
|-----------------------|----------------|

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|---------------------|----------------------------|-------------------|
| Class D | Laborer - Landscape | 08/02/2024 |

Classification Description: Inexperienced Landscape Laborer is defined as an individual who has not worked ninety (90) calendar days under the terms and conditions of this or a similar collective bargaining agreement. An Inexperienced Laborer may be employed by the Contractor Foreman. The ratio may be utilized by the Contractor on a company-wide basis or a project basis. The ratio may be modified by mutual agreement of the Local Union having jurisdiction and the Contractor. The Local Union having jurisdiction on the project shall have first opportunity to refer new employees. See Article 3, Section 3.6.

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$21.74 | \$32.61 | \$43.48 |

Overtime Provisions

| Over 8-hour day/40-hour week | |
|-------------------------------------|---------|
| 9th hour | \$21.74 |
| 10th hour | \$21.74 |
| Beyond 10 hours | \$21.74 |
| Saturday | |
| First 8 hours | \$21.74 |
| 9th hour | \$21.74 |
| 10th hour | \$21.74 |
| Beyond 10 hours | \$21.74 |
| Sunday/Holiday | |
| | \$21.74 |

Four 10-hour days allowed? - No

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|--|----------------------------|-------------------|
| Laborer - Landscape - Class B1 - Z1 | Laborer - Landscape | 05/10/2024 |

Classification Description: Class B1: Landscape Operator includes air, gas, and diesel equipment operator, lawn sprinkler installer, skidsteer, mini excavators, backhoe loaders, ride and walk behind trenchers, off road dump vehicle, articulated haulers, hydroseeder, wheel loaders

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$32.40 | \$42.43 | \$52.95 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|---------|
| 9th hour | \$42.93 |
| 10th hour | \$42.93 |
| Beyond 10 hours | \$42.93 |

Saturday

| | |
|-----------------|---------|
| First 8 hours | \$42.93 |
| 9th hour | \$42.93 |
| 10th hour | \$42.93 |
| Beyond 10 hours | \$42.93 |

| | |
|-----------------------|----------------|
| Sunday/Holiday | \$53.45 |
|-----------------------|----------------|

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|--|----------------------------|-------------------|
| Laborer - Landscape - Class B1 - Z1 | Laborer - Landscape | 05/10/2024 |

Classification Description: Class B1: Landscape Operator includes air, gas, and diesel equipment operator, lawn sprinkler installer, skidsteer, mini excavators, backhoe loaders, ride and walk behind trenchers, off road dump vehicle, articulated haulers, hydroseeder, wheel loaders

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$34.62 | \$46.26 | \$57.89 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|---------|
| 9th hour | \$11.35 |
| 10th hour | \$46.26 |
| Beyond 10 hours | \$46.26 |

Saturday

| | |
|-----------------|---------|
| First 8 hours | \$46.26 |
| 9th hour | \$46.26 |
| 10th hour | \$46.26 |
| Beyond 10 hours | \$46.26 |

| | |
|-----------------------|----------------|
| Sunday/Holiday | \$57.89 |
|-----------------------|----------------|

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|--|----------------------------|-------------------|
| Laborer - Landscape - Class B2 - Z1 | Laborer - Landscape | 05/10/2024 |

Classification Description: Class B2: Skilled Landscape Laborer: small power tool operator, lawn sprinkler installers' tender, irrigation installers' tender, material mover

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$30.40 | \$39.93 | \$49.45 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|---------|
| 9th hour | \$39.93 |
| 10th hour | \$39.93 |
| Beyond 10 hours | \$39.93 |

Saturday

| | |
|-----------------|---------|
| First 8 hours | \$39.93 |
| 9th hour | \$39.93 |
| 10th hour | \$39.93 |
| Beyond 10 hours | \$39.93 |

| | |
|-----------------------|----------------|
| Sunday/Holiday | \$49.45 |
|-----------------------|----------------|

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|---|----------------------------|-------------------|
| Laborer - Landscape - Class C - Z2 | Laborer - Landscape | 05/10/2024 |

Classification Description: Class C: landscape laborer with 90 or more calendar days worked

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$24.66 | \$33.27 | \$41.87 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|---------|
| 9th hour | \$31.98 |
| 10th hour | \$31.98 |
| Beyond 10 hours | \$31.98 |

Saturday

| | |
|-----------------|---------|
| First 8 hours | \$31.98 |
| 9th hour | \$31.98 |
| 10th hour | \$31.98 |
| Beyond 10 hours | \$31.98 |

| | |
|-----------------------|----------------|
| Sunday/Holiday | \$39.30 |
|-----------------------|----------------|

Four 10-hour days allowed? - No

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|---|----------------------------|-------------------|
| Laborer - Landscape - Class D - Z2 | Laborer - Landscape | 05/10/2024 |

Classification Description: Class D: Inexperienced landscape laborer - individual who has worked less than 90 calendar days

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$15.54 | \$23.31 | \$31.08 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|---------|
| 9th hour | \$22.03 |
| 10th hour | \$22.03 |
| Beyond 10 hours | \$22.03 |

Saturday

| | |
|-----------------|---------|
| First 8 hours | \$22.03 |
| 9th hour | \$22.03 |
| 10th hour | \$22.03 |
| Beyond 10 hours | \$22.03 |

| | |
|-----------------------|----------------|
| Sunday/Holiday | \$28.51 |
|-----------------------|----------------|

Four 10-hour days allowed? - No

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|---|--|-------------------|
| Laborer Underground - Tunnel, Shaft & Caisson - Class I - Z1 | Laborer Underground - Tunnel, Shaft & Caisson | 05/10/2024 |

Classification Description: Class I - Tunnel, shaft and caisson laborer, dump man, shanty man, hog house tender, testing man (on gas), and watchman.

| Wage Rates | Straight Time | Time and a Half | Double Time |
|------------------------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$41.17 | \$51.66 | \$62.14 |
| Apprentice: 0-1,000 work hours | \$34.45 | \$43.16 | \$51.85 |
| Apprentice: 1,001-2,000 work hours | \$36.54 | \$46.29 | \$56.03 |
| Apprentice: 2,001-3,000 work hours | \$37.57 | \$47.84 | \$58.09 |
| Apprentice: 3,001-4,000 work hours | \$39.64 | \$50.94 | \$62.23 |

Overtime Provisions

| Over 8-hour day/40-hour week | |
|-------------------------------------|---------|
| 9th hour | \$51.66 |
| 10th hour | \$51.66 |
| Beyond 10 hours | \$51.66 |
| Saturday | |
| First 8 hours | \$51.66 |
| 9th hour | \$51.66 |
| 10th hour | \$51.66 |
| Beyond 10 hours | \$51.66 |
| Sunday/Holiday | |
| | \$62.14 |

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|--|--|-------------------|
| Laborer Underground - Tunnel, Shaft & Caisson - Class II - Z1 | Laborer Underground - Tunnel, Shaft & Caisson | 05/10/2024 |

Classification Description: Class II - Manhole, headwall, catch basin builder, bricklayer tender, mortar man, material mixer, fence erector, and guard rail builder.

| Wage Rates | Straight Time | Time and a Half | Double Time |
|------------------------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$41.28 | \$51.82 | \$62.36 |
| Apprentice: 0-1,000 work hours | \$35.58 | \$44.85 | \$54.11 |
| Apprentice: 1,001-2,000 work hours | \$36.62 | \$46.41 | \$56.19 |
| Apprentice: 2,001-3,000 work hours | \$37.66 | \$47.97 | \$58.27 |
| Apprentice: 3,001-4,000 work hours | \$39.74 | \$51.09 | \$62.43 |

Overtime Provisions

| Over 8-hour day/40-hour week | |
|-------------------------------------|---------|
| 9th hour | \$51.82 |
| 10th hour | \$51.82 |
| Beyond 10 hours | \$51.82 |
| Saturday | |
| First 8 hours | \$51.82 |
| 9th hour | \$51.82 |
| 10th hour | \$51.82 |
| Beyond 10 hours | \$51.82 |
| Sunday/Holiday | |
| | \$62.36 |

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|---|--|-------------------|
| Laborer Underground - Tunnel, Shaft & Caisson - Class III - Z1 | Laborer Underground - Tunnel, Shaft & Caisson | 05/10/2024 |

Classification Description: Class III - Air tool operator (jack hammer man, bush hammer man and grinding man), first bottom man, second bottom man, cage tender, car pusher, carrier man, concrete man, concrete form man, concrete repair man, cement invert laborer, cement finisher, con

| Wage Rates | Straight Time | Time and a Half | Double Time |
|------------------------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$41.34 | \$51.91 | \$62.48 |
| Apprentice: 0-1,000 work hours | \$35.63 | \$44.92 | \$54.21 |
| Apprentice: 1,001-2,000 work hours | \$36.67 | \$46.48 | \$56.29 |
| Apprentice: 2,001-3,000 work hours | \$37.71 | \$48.04 | \$58.37 |
| Apprentice: 3,001-4,000 work hours | \$39.80 | \$51.18 | \$62.55 |

Overtime Provisions

| Over 8-hour day/40-hour week | |
|------------------------------|---------|
| 9th hour | \$51.91 |
| 10th hour | \$51.91 |
| Beyond 10 hours | \$51.91 |
| Saturday | |
| First 8 hours | \$51.91 |
| 9th hour | \$51.91 |
| 10th hour | \$51.91 |
| Beyond 10 hours | \$51.91 |
| Sunday/Holiday | |
| | \$62.48 |

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|--|--|-------------------|
| Laborer Underground - Tunnel, Shaft & Caisson - Class IV - Z1 | Laborer Underground - Tunnel, Shaft & Caisson | 05/10/2024 |

Classification Description: Class IV - Tunnel, shaft and caisson mucker, bracer man, liner plate man, long haul dinky driver and well point man.

| Wage Rates | Straight Time | Time and a Half | Double Time |
|------------------------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$41.52 | \$52.18 | \$62.84 |
| Apprentice: 0-1,000 work hours | \$35.76 | \$45.12 | \$54.47 |
| Apprentice: 1,001-2,000 work hours | \$36.82 | \$46.71 | \$56.59 |
| Apprentice: 2,001-3,000 work hours | \$37.87 | \$48.28 | \$58.69 |
| Apprentice: 3,001-4,000 work hours | \$39.97 | \$51.44 | \$62.89 |

Overtime Provisions

| Over 8-hour day/40-hour week | |
|-------------------------------------|---------|
| 9th hour | \$52.18 |
| 10th hour | \$52.18 |
| Beyond 10 hours | \$52.18 |
| Saturday | |
| First 8 hours | \$52.18 |
| 9th hour | \$52.18 |
| 10th hour | \$52.18 |
| Beyond 10 hours | \$52.18 |
| Sunday/Holiday | |
| | \$62.84 |

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|---|--|-------------------|
| Laborer Underground - Tunnel, Shaft & Caisson - Class V - Z1 | Laborer Underground - Tunnel, Shaft & Caisson | 05/10/2024 |

Classification Description: Class V - Tunnel, shaft and caisson miner, drill runner, keyboard operator, power knife operator, reinforced steel or mesh man (e.g. wire mesh, steel mats, dowel bars)

| Wage Rates | Straight Time | Time and a Half | Double Time |
|------------------------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$41.77 | \$52.56 | \$63.34 |
| Apprentice: 0-1,000 work hours | \$35.95 | \$45.40 | \$54.85 |
| Apprentice: 1,001-2,000 work hours | \$37.02 | \$47.01 | \$56.99 |
| Apprentice: 2,001-3,000 work hours | \$38.08 | \$48.60 | \$59.11 |
| Apprentice: 3,001-4,000 work hours | \$40.21 | \$51.80 | \$63.37 |

Overtime Provisions

| Over 8-hour day/40-hour week | |
|-------------------------------------|---------|
| 9th hour | \$52.56 |
| 10th hour | \$52.56 |
| Beyond 10 hours | \$52.56 |
| Saturday | |
| First 8 hours | \$52.56 |
| 9th hour | \$52.56 |
| 10th hour | \$52.56 |
| Beyond 10 hours | \$52.56 |
| Sunday/Holiday | |
| | \$63.34 |

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|--|--|-------------------|
| Laborer Underground - Tunnel, Shaft & Caisson - Class VI - Z1 | Laborer Underground - Tunnel, Shaft & Caisson | 05/10/2024 |

Classification Description: Class VI - Dynamite man and powder man.

| Wage Rates | Straight Time | Time and a Half | Double Time |
|------------------------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$41.90 | \$54.33 | \$66.75 |
| Apprentice: 0-1,000 work hours | \$36.20 | \$45.78 | \$55.35 |
| Apprentice: 1,001-2,000 work hours | \$37.28 | \$47.40 | \$57.51 |
| Apprentice: 2,001-3,000 work hours | \$38.36 | \$49.02 | \$59.67 |
| Apprentice: 3,001-4,000 work hours | \$40.52 | \$52.26 | \$63.99 |

Overtime Provisions

| Over 8-hour day/40-hour week | |
|-------------------------------------|---------|
| 9th hour | \$52.85 |
| 10th hour | \$52.85 |
| Beyond 10 hours | \$52.85 |
| Saturday | |
| First 8 hours | \$52.85 |
| 9th hour | \$52.85 |
| 10th hour | \$52.85 |
| Beyond 10 hours | \$52.85 |
| Sunday/Holiday | |
| | \$63.80 |

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|---|--|-------------------|
| Laborer Underground - Tunnel, Shaft & Caisson - Class VII - Z1 | Laborer Underground - Tunnel, Shaft & Caisson | 05/10/2024 |

Classification Description: Class VII - Restoration laborer, seeding, sodding, planting, cutting, mulching and topsoil grading and the restoration of property such as replacing mail boxes, wood chips, planter boxes and flagstones.

| Wage Rates | Straight Time | Time and a Half | Double Time |
|------------------------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$35.58 | \$43.17 | \$50.76 |
| Apprentice: 0-1,000 work hours | \$31.39 | \$38.56 | \$45.73 |
| Apprentice: 1,001-2,000 work hours | \$32.15 | \$39.70 | \$47.25 |
| Apprentice: 2,001-3,000 work hours | \$32.91 | \$40.84 | \$48.77 |
| Apprentice: 3,001-4,000 work hours | \$34.43 | \$43.12 | \$51.81 |

Overtime Provisions

| Over 8-hour day/40-hour week | |
|-------------------------------------|---------|
| 9th hour | \$43.17 |
| 10th hour | \$43.17 |
| Beyond 10 hours | \$43.17 |
| Saturday | |
| First 8 hours | \$43.17 |
| 9th hour | \$43.17 |
| 10th hour | \$43.17 |
| Beyond 10 hours | \$43.17 |
| Sunday/Holiday | |
| | \$50.76 |

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|---|---|-------------------|
| Laborer -Underground Open Cut - Class I - Z1 | Laborer -Underground Open Cut, Class I | 05/10/2024 |

Classification Description: Construction Laborer

| Wage Rates | Straight Time | Time and a Half | Double Time |
|------------------------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$36.91 | \$47.01 | \$57.10 |
| Apprentice: 0-1,000 work hours | \$35.39 | \$44.56 | \$53.73 |
| Apprentice: 1,001-2,000 work hours | \$36.42 | \$46.11 | \$55.79 |
| Apprentice: 2,001-3,000 work hours | \$37.44 | \$47.64 | \$57.83 |
| Apprentice: 3,001-4,000 work hours | \$39.49 | \$50.72 | \$61.93 |

Overtime Provisions

| Over 8-hour day/40-hour week | |
|-------------------------------------|---------|
| 9th hour | \$47.01 |
| 10th hour | \$47.01 |
| Beyond 10 hours | \$47.01 |
| Saturday | |
| First 8 hours | \$47.01 |
| 9th hour | \$47.01 |
| 10th hour | \$47.01 |
| Beyond 10 hours | \$47.01 |
| Sunday/Holiday | |
| | \$57.10 |

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|--|--|-------------------|
| Laborer -Underground Open Cut - Class II - Z1 | Laborer -Underground Open Cut, Class II | 05/10/2024 |

Classification Description: Mortar and material mixer, concrete form man, signal man, well point man, manhole, headwall and catch basin builder, guard rail builders, headwall, seawall, breakwall, dock builder and fence erector.

| Wage Rates | Straight Time | Time and a Half | Double Time |
|------------------------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$37.05 | \$47.22 | \$57.38 |
| Apprentice: 0-1,000 work hours | \$35.47 | \$44.68 | \$53.89 |
| Apprentice: 1,001-2,000 work hours | \$36.50 | \$46.23 | \$55.95 |
| Apprentice: 2,001-3,000 work hours | \$37.54 | \$47.79 | \$58.03 |
| Apprentice: 3,001-4,000 work hours | \$39.60 | \$50.88 | \$62.15 |

Overtime Provisions

| Over 8-hour day/40-hour week | |
|-------------------------------------|---------|
| 9th hour | \$47.22 |
| 10th hour | \$47.22 |
| Beyond 10 hours | \$47.22 |
| Saturday | |
| First 8 hours | \$47.22 |
| 9th hour | \$47.22 |
| 10th hour | \$47.22 |
| Beyond 10 hours | \$47.22 |
| Sunday/Holiday | |
| | \$57.38 |

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|---|---|-------------------|
| Laborer -Underground Open Cut - Class III - Z1 | Laborer -Underground Open Cut, Class III | 05/10/2024 |

Classification Description: Air, gasoline and electric tool operator, vibrator operator, drillers, pump man, tar kettle operator, bracers, rodder, reinforced steel or mesh man (e.g. wire mesh, steel mats, dowel bars, etc.), cement finisher, welder, pipe jacking and boring man, wagon

| Wage Rates | Straight Time | Time and a Half | Double Time |
|------------------------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$40.68 | \$52.50 | \$64.31 |
| Apprentice: 0-1,000 work hours | \$35.51 | \$44.74 | \$53.97 |
| Apprentice: 1,001-2,000 work hours | \$36.54 | \$46.29 | \$56.03 |
| Apprentice: 2,001-3,000 work hours | \$37.58 | \$47.85 | \$58.11 |
| Apprentice: 3,001-4,000 work hours | \$39.65 | \$50.96 | \$62.25 |

Overtime Provisions

| Over 8-hour day/40-hour week | |
|------------------------------|---------|
| 9th hour | \$51.02 |
| 10th hour | \$51.02 |
| Beyond 10 hours | \$51.02 |
| Saturday | |
| First 8 hours | \$51.02 |
| 9th hour | \$51.02 |
| 10th hour | \$51.02 |
| Beyond 10 hours | \$51.02 |
| Sunday/Holiday | |
| | \$61.36 |

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|--|--|-------------------|
| Laborer -Underground Open Cut - Class IV - Z1 | Laborer -Underground Open Cut, Class IV | 05/10/2024 |

Classification Description: Trench or excavating grade man.

| Wage Rates | Straight Time | Time and a Half | Double Time |
|------------------------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$40.76 | \$52.62 | \$64.47 |
| Apprentice: 0-1,000 work hours | \$35.57 | \$44.84 | \$54.09 |
| Apprentice: 1,001-2,000 work hours | \$36.61 | \$46.40 | \$56.17 |
| Apprentice: 2,001-3,000 work hours | \$37.65 | \$47.96 | \$58.25 |
| Apprentice: 3,001-4,000 work hours | \$39.72 | \$51.06 | \$62.39 |

Overtime Provisions

| Over 8-hour day/40-hour week | |
|-------------------------------------|---------|
| 9th hour | \$51.14 |
| 10th hour | \$51.14 |
| Beyond 10 hours | \$51.14 |
| Saturday | |
| First 8 hours | \$51.14 |
| 9th hour | \$51.14 |
| 10th hour | \$51.14 |
| Beyond 10 hours | \$51.14 |
| Sunday/Holiday | |
| | \$61.52 |

Four 10-hour days allowed? - Yes
Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|---|---|-------------------|
| Laborer -Underground Open Cut - Class V - Z1 | Laborer -Underground Open Cut, Class V | 05/10/2024 |

Classification Description: Pipe Layer (including crock, metal pipe, mulitplate or other conduits)

| Wage Rates | Straight Time | Time and a Half | Double Time | Overtime Provisions |
|------------------------------------|---------------|-----------------|-------------|-------------------------------------|
| Total Hourly Wage | \$40.82 | \$52.71 | \$64.59 | Over 8-hour day/40-hour week |
| Apprentice: 0-1,000 work hours | \$35.62 | \$44.91 | \$54.19 | 9th hour \$51.23 |
| Apprentice: 1,001-2,000 work hours | \$36.66 | \$46.47 | \$56.27 | 10th hour \$51.23 |
| Apprentice: 2,001-3,000 work hours | \$37.70 | \$48.03 | \$58.35 | Beyond 10 hours \$51.23 |
| Apprentice: 3,001-4,000 work hours | \$39.78 | \$51.15 | \$62.51 | Saturday |
| | | | | First 8 hours \$51.23 |
| | | | | 9th hour \$51.23 |
| | | | | 10th hour \$51.23 |
| | | | | Beyond 10 hours \$51.23 |
| | | | | Sunday/Holiday \$61.64 |

Four 10-hour days allowed? - Yes
Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|--|--|-------------------|
| Laborer -Underground Open Cut - Class VI - Z1 | Laborer -Underground Open Cut, Class VI | 05/10/2024 |

Classification Description: Grouting man, top man assistant, audio visual television operations and all other operations in connection with closed circuit television inspection, pipe cleaning and pipe relining work and the installation and repair of water service pipe and appurtenan

| Wage Rates | Straight Time | Time and a Half | Double Time |
|------------------------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$38.27 | \$48.88 | \$59.49 |
| Apprentice: 0-1,000 work hours | \$33.70 | \$42.03 | \$50.35 |
| Apprentice: 1,001-2,000 work hours | \$34.62 | \$43.41 | \$52.19 |
| Apprentice: 2,001-3,000 work hours | \$35.53 | \$44.78 | \$54.01 |
| Apprentice: 3,001-4,000 work hours | \$37.36 | \$47.52 | \$57.67 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|---------|
| 9th hour | \$47.41 |
| 10th hour | \$47.41 |
| Beyond 10 hours | \$47.41 |

Saturday

| | |
|-----------------|---------|
| First 8 hours | \$47.41 |
| 9th hour | \$47.41 |
| 10th hour | \$47.41 |
| Beyond 10 hours | \$47.41 |

| | |
|-----------------------|----------------|
| Sunday/Holiday | \$56.54 |
|-----------------------|----------------|

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|---|---|-------------------|
| Laborer -Underground Open Cut - Class VII - Z1 | Laborer -Underground Open Cut, Class VII | 05/10/2024 |

Classification Description: Restoration laborer, seeding, sodding, planting, cutting, mulching and topsoil grading and the restoration of property such as replacing mail boxes, wood chips, planter boxes, flagstones etc.

| Wage Rates | Straight Time | Time and a Half | Double Time |
|------------------------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$34.89 | \$43.81 | \$52.73 |
| Apprentice: 0-1,000 work hours | \$31.17 | \$38.24 | \$45.29 |
| Apprentice: 1,001-2,000 work hours | \$31.91 | \$39.34 | \$46.77 |
| Apprentice: 2,001-3,000 work hours | \$32.66 | \$40.47 | \$48.27 |
| Apprentice: 3,001-4,000 work hours | \$34.15 | \$42.70 | \$51.25 |

Overtime Provisions

| Over 8-hour day/40-hour week | |
|-------------------------------------|---------|
| 9th hour | \$42.34 |
| 10th hour | \$42.34 |
| Beyond 10 hours | \$42.34 |
| Saturday | |
| First 8 hours | \$42.34 |
| 9th hour | \$42.34 |
| 10th hour | \$42.34 |
| Beyond 10 hours | \$42.34 |
| Sunday/Holiday | |
| | \$49.78 |

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|---------------------|---------------------------|-------------------|
| Class I | Operating Engineer | 05/10/2024 |

Classification Description: Class I - diver/wet tender, engineer, blaster, leverman

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$82.82 | \$107.82 | \$132.82 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|----------|
| 9th hour | \$32.82 |
| 10th hour | \$107.82 |
| Beyond 10 hours | \$107.82 |

Saturday

| | |
|-----------------|----------|
| First 8 hours | \$107.82 |
| 9th hour | \$107.82 |
| 10th hour | \$107.82 |
| Beyond 10 hours | \$107.82 |

Sunday/Holiday

| | |
|--|----------|
| | \$132.82 |
|--|----------|

Four 10-hour days allowed? - No

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|---------------------|---------------------------|-------------------|
| Class II (A) | Operating Engineer | 05/10/2024 |

Classification Description: Class II (A) - Crane/backhoe operator, material handler, all self-propelled drill rigs, mechanic/welder, hydraulic dredge, diver tender

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$81.32 | \$105.57 | \$129.82 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|----------|
| 9th hour | \$32.82 |
| 10th hour | \$105.57 |
| Beyond 10 hours | \$105.57 |

Saturday

| | |
|-----------------|----------|
| First 8 hours | \$105.57 |
| 9th hour | \$105.57 |
| 10th hour | \$105.57 |
| Beyond 10 hours | \$105.57 |

| | |
|-----------------------|-----------------|
| Sunday/Holiday | \$129.82 |
|-----------------------|-----------------|

Four 10-hour days allowed? - No

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|---------------------|---------------------------|-------------------|
| Class II (B) | Operating Engineer | 05/10/2024 |

Classification Description: Class II (B) - friction, lattice boom, tug or tug boat operator

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$84.32 | \$110.07 | \$135.82 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|----------|
| 9th hour | \$110.07 |
| 10th hour | \$110.07 |
| Beyond 10 hours | \$110.07 |

Saturday

| | |
|-----------------|----------|
| First 8 hours | \$110.07 |
| 9th hour | \$110.07 |
| 10th hour | \$110.07 |
| Beyond 10 hours | \$110.07 |

| | |
|-----------------------|-----------------|
| Sunday/Holiday | \$135.82 |
|-----------------------|-----------------|

Four 10-hour days allowed? - No

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|---------------------|---------------------------|-------------------|
| Class III | Operating Engineer | 05/10/2024 |

Classification Description: Class III - Deck equip. operator, maintenance of crane or excavator, tug/launch operator, loader/dozer on barge/deck machinery, truck-able tug, lead surveyor, ROV operator, AB deckhand, welder

| Wage Rates | Straight Time | Time and a Half | Double Time | Overtime Provisions |
|-------------------|---------------|-----------------|-------------|-------------------------------------|
| Total Hourly Wage | \$76.82 | \$98.82 | \$120.82 | Over 8-hour day/40-hour week |
| | | | | 9th hour \$98.82 |
| | | | | 10th hour \$98.82 |
| | | | | Beyond 10 hours \$98.82 |
| | | | | Saturday |
| | | | | First 8 hours \$98.82 |
| | | | | 9th hour \$98.82 |
| | | | | 10th hour \$98.82 |
| | | | | Beyond 10 hours \$98.82 |
| | | | | Sunday/Holiday \$120.82 |

Four 10-hour days allowed? - No

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|---------------------|---------------------------|-------------------|
| Class IV | Operating Engineer | 05/10/2024 |

Classification Description: Class IV - Deck equipment operator, machineryman/fireman, off road trucks, deck hand, tug engineer, assistant tug operator, blaster helper, deck hand, jet machine, subsea plow, trencher, tug engineer

| Wage Rates | Straight Time | Time and a Half | Double Time | Overtime Provisions |
|-------------------|---------------|-----------------|-------------|-------------------------------------|
| Total Hourly Wage | \$72.32 | \$92.07 | \$111.82 | Over 8-hour day/40-hour week |
| | | | | 9th hour \$32.82 |
| | | | | 10th hour \$92.07 |
| | | | | Beyond 10 hours \$92.07 |
| | | | | Saturday |
| | | | | First 8 hours \$92.07 |
| | | | | 9th hour \$92.07 |
| | | | | 10th hour \$92.07 |
| | | | | Beyond 10 hours \$92.07 |
| | | | | Sunday/Holiday \$111.82 |

Four 10-hour days allowed? - No

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|---|---------------------------|-------------------|
| Extended Boom Forklift Operator - Over 5,000 | Operating Engineer | 05/10/2024 |

Classification Description: Extended boom forklift/forktruck over 5,000lb capacity, 1 drum hoist

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$41.43 | \$54.43 | \$67.42 |

Overtime Provisions

| Over 8-hour day/40-hour week | |
|-------------------------------------|---------|
| 9th hour | \$54.43 |
| 10th hour | \$54.43 |
| Beyond 10 hours | \$67.42 |
| Saturday | |
| First 8 hours | \$54.43 |
| 9th hour | \$54.43 |
| 10th hour | \$54.43 |
| Beyond 10 hours | \$67.42 |
| Sunday/Holiday | |
| | \$67.42 |

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|---|---------------------------|-------------------|
| Extended Boom Forklift Operator - Over 5,000 | Operating Engineer | 05/10/2024 |

Classification Description: Extended boom forklift/forktruck over 5,000lb capacity, 1 drum hoist

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$58.82 | \$73.32 | \$87.81 |

Overtime Provisions

| Over 8-hour day/40-hour week | |
|-------------------------------------|---------|
| 9th hour | \$73.32 |
| 10th hour | \$73.32 |
| Beyond 10 hours | \$87.81 |
| Saturday | |
| First 8 hours | \$73.32 |
| 9th hour | \$73.32 |
| 10th hour | \$73.32 |
| Beyond 10 hours | \$87.81 |
| Sunday/Holiday | |
| | \$87.81 |

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|---|---------------------------|-------------------|
| Extended Boom Forklift Operator - Over 5,000 | Operating Engineer | 05/10/2024 |

Classification Description: Extended boom forklift/forktruck over 5,000lb capacity, 1 drum hoist

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$64.70 | \$81.75 | \$98.80 |

Overtime Provisions

| Over 8-hour day/40-hour week | |
|-------------------------------------|---------|
| 9th hour | \$81.75 |
| 10th hour | \$81.75 |
| Beyond 10 hours | \$98.80 |
| Saturday | |
| First 8 hours | \$81.75 |
| 9th hour | \$81.75 |
| 10th hour | \$81.75 |
| Beyond 10 hours | \$98.80 |
| Sunday/Holiday | |
| | \$98.80 |

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|---|---------------------------|-------------------|
| Extended Boom Forklift Operator - Over 5,000 | Operating Engineer | 05/10/2024 |

Classification Description: Extended boom forklift/forktruck over 5,000lb capacity, 1 drum hoist

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$69.61 | \$88.88 | \$108.15 |

Overtime Provisions

| Over 8-hour day/40-hour week | |
|-------------------------------------|----------|
| 9th hour | \$88.88 |
| 10th hour | \$88.88 |
| Beyond 10 hours | \$108.15 |
| Saturday | |
| First 8 hours | \$88.88 |
| 9th hour | \$88.88 |
| 10th hour | \$88.88 |
| Beyond 10 hours | \$108.15 |
| Sunday/Holiday | |
| | \$108.15 |

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|---|---------------------------|-------------------|
| Extended Boom Forklift Operator - Over 5,000 | Operating Engineer | 05/10/2024 |

Classification Description: Extended boom forklift/forktruck over 5,000lb capacity, 1 drum hoist

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$63.29 | \$79.73 | \$96.16 |

Overtime Provisions

| Over 8-hour day/40-hour week | |
|-------------------------------------|---------|
| 9th hour | \$79.73 |
| 10th hour | \$79.73 |
| Beyond 10 hours | \$96.16 |
| Saturday | |
| First 8 hours | \$79.73 |
| 9th hour | \$79.73 |
| 10th hour | \$79.73 |
| Beyond 10 hours | \$96.16 |
| Sunday/Holiday | |
| | \$96.16 |

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|-------------------------|---------------------------|-------------------|
| Fireman or Oiler | Operating Engineer | 08/01/2024 |

Classification Description: Fireman or Oiler

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$59.08 | \$75.85 | \$92.62 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|---------|
| 9th hour | \$59.08 |
| 10th hour | \$59.08 |
| Beyond 10 hours | \$88.24 |

Saturday

| | |
|-----------------|---------|
| First 8 hours | \$59.08 |
| 9th hour | \$88.24 |
| 10th hour | \$88.24 |
| Beyond 10 hours | \$88.24 |

| | |
|-----------------------|----------------|
| Sunday/Holiday | \$88.24 |
|-----------------------|----------------|

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Overtime Rate Comment: Monday-Friday-Double time after 12hrs/day
Saturday-Double time starts after 40 hrs otherwise first 8 are time and a half

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|-----------------------------|---------------------------|-------------------|
| Journeyman - Class I | Operating Engineer | 05/17/2024 |

Classification Description: Journeyman - Class I

Asphalt Transfer Machine (Shuttle Buggy)

Concrete/Asphalt Pavers

Excavators Installing Utilities over 20 feet in depth

GPS or Electronic Grade Equipment (employee must be able to set up and use it on machine themselves, and employee can install it and calibrate it on their own)

Hydraulic/Lattice Lifting Cranes over 25 tons

Mechanic

**On bridge construction projects when a Class I Crane Operator is erecting structural components as part of a composite crew with Structural Ironworkers, the Base Rate and Vacation and Holiday pay shall be at the Crane Operator rate as set forth in the current agreement between the Union and the Great Lakes Fabricators and Erectors Association.

| Wage Rates | Straight Time | Time and a Half | Double Time |
|--|---------------|-----------------|-------------|
| Total Hourly Wage | \$69.17 | \$88.16 | \$107.14 |
| Apprentice: Apprentice Engineer 0-6 months | \$56.03 | \$71.32 | \$86.60 |
| Apprentice: Apprentice Engineer 13-18 | \$60.40 | \$77.87 | \$95.34 |
| Apprentice: Apprentice Engineer 19-24 months | \$62.21 | \$80.59 | \$98.96 |
| Apprentice: Apprentice Engineer 25-30 months | \$64.76 | \$84.42 | \$104.06 |
| Apprentice: Apprentice Engineer 31-36 months | \$67.08 | \$87.90 | \$108.70 |
| Apprentice: Apprentice Engineer 7-12 months | \$58.21 | \$74.58 | \$90.96 |

Overtime Provisions

| Over 8-hour day/40-hour week | |
|------------------------------|----------|
| 9th hour | \$88.16 |
| 10th hour | \$88.16 |
| Beyond 10 hours | \$88.16 |
| Saturday | |
| First 8 hours | \$88.16 |
| 9th hour | \$88.16 |
| 10th hour | \$88.16 |
| Beyond 10 hours | \$88.16 |
| Sunday/Holiday | |
| | \$107.14 |

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

In the event work is unable to be performed on account of weather, Monday through Thursday, the Friday work may be scheduled for ten (10) hours, at straight time, as a make-up day.

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|------------------------------|---------------------------|-------------------|
| Journeyman - Class II | Operating Engineer | 05/17/2024 |

Classification Description: Journeyman - Class II

- Air Compressors in Manifold with throttle valve +750 cfm
- Asphalt Bituminous Compactor / Roller
- Asphalt Planner self-propelled
- Asphalt Plant on project including operating from on site or operating remotely
- Asphalt Screed or Screw (per Employer Past Practice)
- Auto Grade or similar type machine
- Backhoe on Farm Type Tractor 45 H.P. & over
- Ballast Jack Tamper
- Ballast Regulator (R.R.)
- Batch Plant (concrete-central mix)
- Bituminous Paver (self-propelled)
- Blade Grader
- Bull Dozer
- Caisson Drilling Machine
- Cherry Picker – 15 ton or over
- Chip Spreader
- Concrete Batch or Drum Mix Plant on project including operating from on site or operating remotely
- Concrete Belt Placer (Formless)
- Concrete Cure / Finish Machine (burlap, tinning or grooving)
- Concrete Mixer 21 cu. Ft. Or over
- Concrete Pump (Truck Mount)
- Concrete Pump (3 inch and over)
- Concrete / Asphalt Saw Power Driven (3 yrs experience or more)
- Conveyor Loader (Euclid type)
- Core Drilling Machine
- Curb-Barrier Wall Machine CMI type
- Directional Drill / Boring Machine
- Dredge Engineer
- Dredge
- Drilling Machine on which the drill is an integral part
- Earth Mover – rubber tired – (paddle wheel, Cat 619, 631, TS-24 or similar type)
- Earth Mover rubber tired-tandem

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$68.02 | \$86.51 | \$104.99 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|---------|
| 9th hour | \$86.50 |
| 10th hour | \$86.50 |
| Beyond 10 hours | \$86.50 |

Saturday

| | |
|-----------------|---------|
| First 8 hours | \$86.50 |
| 9th hour | \$86.50 |
| 10th hour | \$86.50 |
| Beyond 10 hours | \$86.50 |

| | |
|-----------------------|-----------------|
| Sunday/Holiday | \$104.99 |
|-----------------------|-----------------|

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|-------------------------------|---------------------------|-------------------|
| Journeyman - Class III | Operating Engineer | 05/17/2024 |

Classification Description: Journeyman - Class III
Air Compressor with Throttle Valve or Clever Brooks type comb.
Backhoe less than 1 cyd. Including Farm Type
Bituminous Plant Engineer
Chemical / Grout Machine 21 cft. Or larger
Cherry Picker under 15 ton
Chip Spreader (self-propelled)
Crusher
Concrete Barrier Moving Machine (per Employer Past Practice)
Concrete Pump
Concrete Spreader--Power Driven
End Loader under 1-1/2 cu yd.
Grease Truck
Gunit Machine
Lowboy (per Employer Past Practice)
Mesh or Steel Placer (motorized)
Multiple Tamping Machine (R.R.)
Refrigerating Machine--Freezing operation
Roller-Waterbound Macadam, Bituminous Macadam, Brick
Ross Carrier
Self-propelled convey transfer devise.
Side Boom Tractor (smaller than D-4 type or equivalent)
Sweeper (Wayne type and similar equipment)
Macadam, Brick Surface
Trench Machine 24" and under
Tube Float (motorized)

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$61.29 | \$76.85 | \$92.41 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|---------|
| 9th hour | \$30.17 |
| 10th hour | \$76.85 |
| Beyond 10 hours | \$76.85 |

Saturday

| | |
|-----------------|---------|
| First 8 hours | \$76.85 |
| 9th hour | \$76.85 |
| 10th hour | \$76.85 |
| Beyond 10 hours | \$76.85 |

| | |
|-----------------------|----------------|
| Sunday/Holiday | \$92.41 |
|-----------------------|----------------|

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|------------------------------|---------------------------|-------------------|
| Journeyman - Class IV | Operating Engineer | 05/17/2024 |

Classification Description: Journeyman - Class IV

- Air Compressor
- All mulching equipment
- All Walk Behind or Remote Control Powered Equipment (autonomous equipment)
- Assistant to Engineer Automatic Dry Batch Plant Belt Spreader (motorized including transfer device by remote, wireless or cable)
- Bituminous Distributor
- Bituminous Patching Machine
- Broom & Belt Machine
- Chair Cart (self-propelled)
- Concrete Pumps (under 3")
- Concrete Breaker
- Curb Machine
- Curing Equipment (self-propelled)
- Deck Hand
- Digger Post Hole (power-driven)
- Dump Truck
- End Dumps (per Employer Past Practice)
- End Loader (under ¾ yard capacity)
- Farm Tractor-incl. farm tractor with all attachments except backhoe and incl. highlift end loaders of 1 cu. Yard capacity or less
- Fireman (on boiler)
- Fork Lift – under 10 ton
- Form Grader (if motorized)
- Georgia Buggy – Power wheel barrel ¾ yard with a seat
- Generator (15 kw or greater)
- Greaser Helper
- Guard Post Driver (power driven)

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$60.73 | \$76.05 | \$91.36 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|---------|
| 9th hour | \$76.05 |
| 10th hour | \$76.05 |
| Beyond 10 hours | \$76.05 |

Saturday

| | |
|-----------------|---------|
| First 8 hours | \$76.05 |
| 9th hour | \$76.05 |
| 10th hour | \$76.05 |
| Beyond 10 hours | \$76.05 |

| | |
|-----------------------|----------------|
| Sunday/Holiday | \$91.36 |
|-----------------------|----------------|

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|-----------------------------|---------------------------|-------------------|
| Journeyman - Class V | Operating Engineer | 05/17/2024 |

Classification Description: Journeyman - Class V
 Concrete/Asphalt Saw - Power Driven (Less than 3 yrs. experience)
 Density/Soil Engineer
 Directional Boring Utility Man
 Discharge Pumps 4" or less (1-4 units)
 Dumper (Wagon, Truck, Etc.)-1/2 yard or less
 Fence Erector/Power Driven
 Light Plants (1 to 5 units)
 Paving Batch Truck Dumper
 Roto Mill Utility Grade Control
 Sign Installer/Sign Installer with Remote Control Operated Equipment
 Top Man, And Railroad Track and Trestle Engineer
 Utility Engineer
 Water Blasting Utility Engineer
 1 to 4 pcs. of minor equip.

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$42.35 | \$55.33 | \$68.31 |

Overtime Provisions

| Over 8-hour day/40-hour week | |
|-------------------------------------|---------|
| 9th hour | \$55.33 |
| 10th hour | \$55.33 |
| Beyond 10 hours | \$55.33 |
| Saturday | |
| First 8 hours | \$55.33 |
| 9th hour | \$55.33 |
| 10th hour | \$55.33 |
| Beyond 10 hours | \$55.33 |
| Sunday/Holiday | |
| | \$68.31 |

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|--------------------------------------|---------------------------|-------------------|
| Operating Engineer - 324 A140 | Operating Engineer | 05/10/2024 |

Classification Description: Crane with boom & jib or leads 140' or longer

Work in excess of 12 per day M-F shall be paid at double time.

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$77.59 | \$100.24 | \$122.89 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|----------|
| 9th hour | \$100.24 |
| 10th hour | \$100.24 |
| Beyond 10 hours | \$100.24 |

Saturday

| | |
|-----------------|----------|
| First 8 hours | \$100.24 |
| 9th hour | \$100.24 |
| 10th hour | \$100.24 |
| Beyond 10 hours | \$100.24 |

| | |
|-----------------------|-----------------|
| Sunday/Holiday | \$122.89 |
|-----------------------|-----------------|

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Overtime Rate Comment: Double time after 12 hours Mon-Sat

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|--------------------------------------|---------------------------|-------------------|
| Operating Engineer - 324 A220 | Operating Engineer | 05/10/2024 |

Classification Description: Crane with boom & jib or leads 220' or longer
 Work in excess of 12 per day M-F shall be paid at double time.

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$77.86 | \$100.63 | \$123.40 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|----------|
| 9th hour | \$100.63 |
| 10th hour | \$100.63 |
| Beyond 10 hours | \$100.63 |

Saturday

| | |
|-----------------|----------|
| First 8 hours | \$100.63 |
| 9th hour | \$100.63 |
| 10th hour | \$100.63 |
| Beyond 10 hours | \$100.63 |

| | |
|-----------------------|-----------------|
| Sunday/Holiday | \$123.40 |
|-----------------------|-----------------|

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Overtime Rate Comment: Double time after 12 hours Mon-Sat

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|--------------------------------------|---------------------------|-------------------|
| Operating Engineer - 324 B120 | Operating Engineer | 06/20/2024 |

Classification Description: Crane Operator w/120' of Boom or Longer w/Oiler

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$77.41 | \$99.99 | \$122.56 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|---------|
| 9th hour | \$99.98 |
| 10th hour | \$99.98 |
| Beyond 10 hours | \$99.98 |

Saturday

| | |
|-----------------|---------|
| First 8 hours | \$99.98 |
| 9th hour | \$99.98 |
| 10th hour | \$99.98 |
| Beyond 10 hours | \$99.98 |

| | |
|-----------------------|-----------------|
| Sunday/Holiday | \$122.56 |
|-----------------------|-----------------|

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Overtime Rate Comment: Double time after 12 Mon-Sat

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|------------------------------------|---------------------------|-------------------|
| Operating Engineer - 324 GM | Operating Engineer | 06/20/2024 |

Classification Description: Ground Man/Light Plants/Welder/Pumps Under 6"

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$43.83 | \$57.87 | \$71.91 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|---------|
| 9th hour | \$57.87 |
| 10th hour | \$57.87 |
| Beyond 10 hours | \$57.87 |

Saturday

| | |
|-----------------|---------|
| First 8 hours | \$57.87 |
| 9th hour | \$57.87 |
| 10th hour | \$57.87 |
| Beyond 10 hours | \$57.87 |

Sunday/Holiday

| | |
|--|---------|
| | \$71.91 |
|--|---------|

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Overtime Rate Comment: Double time after 12 Mon-Sat

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|--|---------------------------|-------------------|
| Operating Engineer - Below 5,000lb Capacity | Operating Engineer | 06/20/2024 |

Classification Description: Ind. forklift/forktruck under 5,000lb capacity
power jacks/power packs, composite crew only

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$67.10 | \$85.19 | \$103.28 |

Overtime Provisions

| Over 8-hour day/40-hour week | |
|-------------------------------------|----------|
| 9th hour | \$85.19 |
| 10th hour | \$85.19 |
| Beyond 10 hours | \$85.19 |
| Saturday | |
| First 8 hours | \$85.19 |
| 9th hour | \$85.19 |
| 10th hour | \$85.19 |
| Beyond 10 hours | \$85.19 |
| Sunday/Holiday | |
| | \$103.28 |

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Overtime Rate Comment: Double time after 12 Mon-Sat

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|--|---------------------------|-------------------|
| Operating Engineer - Crane Operator w/Oiler | Operating Engineer | 06/20/2024 |

Classification Description: Crane Operator w/Oiler

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$77.05 | \$99.47 | \$121.89 |

Overtime Provisions

| Over 8-hour day/40-hour week | |
|-------------------------------------|----------|
| 9th hour | \$99.47 |
| 10th hour | \$99.47 |
| Beyond 10 hours | \$99.47 |
| Saturday | |
| First 8 hours | \$99.47 |
| 9th hour | \$99.47 |
| 10th hour | \$99.47 |
| Beyond 10 hours | \$99.47 |
| Sunday/Holiday | |
| | \$121.89 |

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Overtime Rate Comment: Double time after 12 Mon-Sat

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|---|---------------------------|-------------------|
| Operating Engineer - Crane, TDH, Excavator | Operating Engineer | 06/20/2024 |

Classification Description: Crane Operator, Job Mechanic, Three Drum Hoist and Excavator

| Wage Rates | Straight Time | Time and a Half | Double Time |
|--|---------------|-----------------|-------------|
| Total Hourly Wage | \$76.05 | \$98.04 | \$120.02 |
| Apprentice: Apprentice Engineer 0-6 months | \$60.84 | \$78.54 | \$96.24 |
| Apprentice: Apprentice Engineer 13-18 months | \$65.90 | \$86.13 | \$106.36 |
| Apprentice: Apprentice Engineer 19-24 months | \$68.42 | \$89.92 | \$111.40 |
| Apprentice: Apprentice Engineer 25-30 months | \$70.95 | \$93.71 | \$116.46 |
| Apprentice: Apprentice Engineer 31-36 months | \$73.48 | \$97.50 | \$121.52 |
| Apprentice: Apprentice Engineer 7-12 months | \$63.40 | \$82.38 | \$101.36 |

Overtime Provisions

| Over 8-hour day/40-hour week | |
|-------------------------------------|----------|
| 9th hour | \$98.03 |
| 10th hour | \$98.03 |
| Beyond 10 hours | \$98.03 |
| Saturday | |
| First 8 hours | \$98.03 |
| 9th hour | \$98.03 |
| 10th hour | \$98.03 |
| Beyond 10 hours | \$98.03 |
| Sunday/Holiday | |
| | \$120.02 |

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Overtime Rate Comment: Double time after 12 Mon-Sat

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|--------------------------------|---------------------------|-------------------|
| Operating Engineer - CW | Operating Engineer | 05/10/2024 |

Classification Description: Compressor or welding machine
 Work in excess of 12 per day M-F shall be paid at double time.

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$54.86 | \$69.72 | \$84.58 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|---------|
| 9th hour | \$67.78 |
| 10th hour | \$67.78 |
| Beyond 10 hours | \$67.78 |

Saturday

| | |
|-----------------|---------|
| First 8 hours | \$67.78 |
| 9th hour | \$80.70 |
| 10th hour | \$80.70 |
| Beyond 10 hours | \$80.70 |

Sunday/Holiday

\$80.70

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|-------------------------------|---------------------------|-------------------|
| Operating Engineer - F | Operating Engineer | 05/10/2024 |

Classification Description: Forklift, lull, extend-a-boom forklift
 Work in excess of 12 per day M-F shall be paid at double time.

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$63.36 | \$79.81 | \$96.25 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|---------|
| 9th hour | \$79.81 |
| 10th hour | \$79.81 |
| Beyond 10 hours | \$79.81 |

Saturday

| | |
|-----------------|---------|
| First 8 hours | \$79.81 |
| 9th hour | \$96.25 |
| 10th hour | \$96.25 |
| Beyond 10 hours | \$96.25 |

Sunday/Holiday

\$96.25

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|--------------------------------|---------------------------|-------------------|
| Operating Engineer - FO | Operating Engineer | 05/10/2024 |

Classification Description: Fireman or oiler

Work in excess of 12 per day M-F shall be paid at double time.

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$53.83 | \$68.18 | \$82.52 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|---------|
| 9th hour | \$66.31 |
| 10th hour | \$66.31 |
| Beyond 10 hours | \$66.31 |

Saturday

| | |
|-----------------|---------|
| First 8 hours | \$66.31 |
| 9th hour | \$78.78 |
| 10th hour | \$78.78 |
| Beyond 10 hours | \$78.78 |

| | |
|-----------------------|----------------|
| Sunday/Holiday | \$78.78 |
|-----------------------|----------------|

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|---------------------------------|---------------------------|-------------------|
| Operating Engineer - FSM | Operating Engineer | 05/10/2024 |

Classification Description: Forklift or Straight Mast

Four 10 hour days may be scheduled M-Th or T-F. Work not performed due to weather on M-Th may be scheduled on Friday

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$57.50 | \$71.40 | \$85.29 |

Overtime Provisions

| Over 8-hour day/40-hour week | |
|-------------------------------------|---------|
| 9th hour | \$71.40 |
| 10th hour | \$71.40 |
| Beyond 10 hours | \$71.40 |
| Saturday | |
| First 8 hours | \$71.40 |
| 9th hour | \$85.29 |
| 10th hour | \$85.29 |
| Beyond 10 hours | \$85.29 |
| Sunday/Holiday | |
| | \$85.29 |

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

Friday

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|-------------------------------|---------------------------|-------------------|
| Operating Engineer - I | Operating Engineer | 05/10/2024 |

Classification Description: Lull or Extend-a-Boom Forklift

Four 10 hour days may be scheduled M-Th or T-F. Work not performed due to weather on M-Th may be scheduled on Friday

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$59.73 | \$77.09 | \$94.45 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|---------|
| 9th hour | \$74.83 |
| 10th hour | \$74.83 |
| Beyond 10 hours | \$74.83 |

Saturday

| | |
|-----------------|---------|
| First 8 hours | \$74.83 |
| 9th hour | \$89.92 |
| 10th hour | \$89.92 |
| Beyond 10 hours | \$89.92 |

| | |
|-----------------------|----------------|
| Sunday/Holiday | \$89.92 |
|-----------------------|----------------|

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

Friday

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|---|---------------------------|-------------------|
| Operating Engineer - OE 324 A120 | Operating Engineer | 01/09/2025 |

Classification Description: Crane with boom & jib or leads 120' or longer

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$76.41 | \$98.55 | \$120.69 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|---------|
| 9th hour | \$98.55 |
| 10th hour | \$98.55 |
| Beyond 10 hours | \$98.55 |

Saturday

| | |
|-----------------|---------|
| First 8 hours | \$98.55 |
| 9th hour | \$98.55 |
| 10th hour | \$98.55 |
| Beyond 10 hours | \$98.55 |

| | |
|-----------------------|-----------------|
| Sunday/Holiday | \$120.69 |
|-----------------------|-----------------|

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Overtime Rate Comment: Double time over 12 Mon-Sat

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|-----------------------------------|---------------------------|-------------------|
| Operating Engineer - os120 | Operating Engineer | 05/10/2024 |

Classification Description: Crane with main boom & jib 120' or longer

Four 10 hour days may be scheduled Monday-Thursday or Tuesday-Friday. Worked not performed due to weather, Monday-Thursday may be scheuled Friday

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$63.27 | \$82.40 | \$101.53 |

Overtime Provisions

| Over 8-hour day/40-hour week | |
|-------------------------------------|---------|
| 9th hour | \$79.91 |
| 10th hour | \$79.91 |
| Beyond 10 hours | \$79.91 |
| Saturday | |
| First 8 hours | \$79.91 |
| 9th hour | \$96.54 |
| 10th hour | \$96.54 |
| Beyond 10 hours | \$96.54 |
| Sunday/Holiday | |
| | \$96.54 |

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

Friday

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|--------------------------------|---------------------------|-------------------|
| Operating Engineer - RC | Operating Engineer | 05/10/2024 |

Classification Description: Regular crane, job mechanic, concrete pump with boom

Work in excess of 12 per day M-F shall be paid at double time.

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$64.85 | \$84.71 | \$104.56 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|---------|
| 9th hour | \$82.12 |
| 10th hour | \$82.12 |
| Beyond 10 hours | \$82.12 |

Saturday

| | |
|-----------------|---------|
| First 8 hours | \$82.12 |
| 9th hour | \$99.38 |
| 10th hour | \$99.38 |
| Beyond 10 hours | \$99.38 |

| | |
|-----------------------|----------------|
| Sunday/Holiday | \$99.38 |
|-----------------------|----------------|

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|--|---------------------------|-------------------|
| Operating Engineer - Skidsteer Operator | Operating Engineer | 06/20/2024 |

Classification Description: Skidsteer forklift when working with fence and Door companies

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$65.69 | \$83.17 | \$100.65 |

Overtime Provisions

| Over 8-hour day/40-hour week | |
|-------------------------------------|----------|
| 9th hour | \$83.17 |
| 10th hour | \$83.17 |
| Beyond 10 hours | \$83.17 |
| Saturday | |
| First 8 hours | \$83.17 |
| 9th hour | \$83.17 |
| 10th hour | \$83.17 |
| Beyond 10 hours | \$83.17 |
| Sunday/Holiday | |
| | \$100.65 |

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Overtime Rate Comment: Double time after 12 Mon-Sat

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|--|---------------------------|-------------------|
| Operating Engineer - TDH, Backhoe | Operating Engineer | 06/20/2024 |

Classification Description: Hoisting Operator, Two Drum Hoist, Rubber Tire Backhoe

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$75.41 | \$97.11 | \$118.82 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|---------|
| 9th hour | \$97.11 |
| 10th hour | \$97.11 |
| Beyond 10 hours | \$97.11 |

Saturday

| | |
|-----------------|---------|
| First 8 hours | \$97.11 |
| 9th hour | \$97.11 |
| 10th hour | \$97.11 |
| Beyond 10 hours | \$97.11 |

| | |
|-----------------------|-----------------|
| Sunday/Holiday | \$118.82 |
|-----------------------|-----------------|

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Overtime Rate Comment: Double time after 12 Mon-Sat

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|--|---------------------------|-------------------|
| Operating Engineer-Boom and Jib or Leads 120' or longer | Operating Engineer | 08/01/2024 |

Classification Description: Engineer when operating Crane with Boom and Jib or Leads 120' or longer

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$70.96 | \$93.68 | \$116.38 |

Overtime Provisions

| Over 8-hour day/40-hour week | |
|-------------------------------------|----------|
| 9th hour | \$70.96 |
| 10th hour | \$70.96 |
| Beyond 10 hours | \$90.70 |
| Saturday | |
| First 8 hours | \$90.70 |
| 9th hour | \$110.45 |
| 10th hour | \$110.45 |
| Beyond 10 hours | \$110.45 |
| Sunday/Holiday | |
| | \$110.45 |

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Overtime Rate Comment: Monday-Friday-Double time after 12hrs/day
Saturday-Double time starts after 40 hrs otherwise first 8 are time and a half

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|--|---------------------------|-------------------|
| Operating Engineer-Boom and Jib or Leads 140' or longer | Operating Engineer | 08/01/2024 |

Classification Description: Engineer when operating Crane with Boom and Jib or Leads 140' or longer

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$71.78 | \$94.91 | \$118.02 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|---------|
| 9th hour | \$71.78 |
| 10th hour | \$71.78 |
| Beyond 10 hours | \$91.89 |

Saturday

| | |
|-----------------|----------|
| First 8 hours | \$71.78 |
| 9th hour | \$111.99 |
| 10th hour | \$111.99 |
| Beyond 10 hours | \$111.99 |

| | |
|-----------------------|-----------------|
| Sunday/Holiday | \$111.99 |
|-----------------------|-----------------|

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Overtime Rate Comment: Monday-Friday-Double time after 12hrs/day
Saturday-Double time starts after 40 hrs otherwise first 8 are time and a half

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|--|---------------------------|-------------------|
| Operating Engineer-Boom and Jib or Leads 220' or longer | Operating Engineer | 08/01/2024 |

Classification Description: Engineer when operating Crane with Boom and Jib or Leads 220' or longer

| Wage Rates | Straight Time | Time and a Half | Double Time | Overtime Provisions |
|-------------------|---------------|-----------------|-------------|-------------------------------------|
| Total Hourly Wage | \$72.08 | \$95.36 | \$118.62 | Over 8-hour day/40-hour week |
| | | | | 9th hour \$92.31 |
| | | | | 10th hour \$92.31 |
| | | | | Beyond 10 hours \$92.31 |
| | | | | Saturday |
| | | | | First 8 hours \$72.08 |
| | | | | 9th hour \$112.55 |
| | | | | 10th hour \$112.55 |
| | | | | Beyond 10 hours \$112.55 |
| | | | | Sunday/Holiday \$112.55 |

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Overtime Rate Comment: Monday-Friday-Double time after 12hrs/day
Saturday-Double time starts after 40 hrs otherwise first 8 are time and a half

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|--|---------------------------|-------------------|
| Operating Engineer-Boom and Jib or Leads 300' or longer | Operating Engineer | 08/01/2024 |

Classification Description: Engineer when operating Crane with Boom and Jib or Leads 300' or longer

| Wage Rates | Straight Time | Time and a Half | Double Time | Overtime Provisions |
|-------------------|---------------|-----------------|-------------|-------------------------------------|
| Total Hourly Wage | \$73.58 | \$97.60 | \$121.62 | Over 8-hour day/40-hour week |
| | | | | 9th hour \$73.58 |
| | | | | 10th hour \$73.58 |
| | | | | Beyond 10 hours \$73.58 |
| | | | | Saturday |
| | | | | First 8 hours \$73.58 |
| | | | | 9th hour \$115.35 |
| | | | | 10th hour \$115.35 |
| | | | | Beyond 10 hours \$115.35 |
| | | | | Sunday/Holiday \$115.35 |

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Overtime Rate Comment: Mon-Fri-Double time after 12 hrs/day
Sat-time and a half first 8 hours unless over 40, then double time

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|--|---------------------------|-------------------|
| Operating Engineer-Boom and Jib or Leads 400' or longer | Operating Engineer | 08/01/2024 |

Classification Description: Engineer when operating Crane with Boom and Jib or Leads 400' or longer

| Wage Rates | Straight Time | Time and a Half | Double Time | Overtime Provisions |
|---|---------------|-----------------|-------------|-------------------------------------|
| Total Hourly Wage | \$75.08 | \$96.62 | \$118.16 | Over 8-hour day/40-hour week |
| Apprentice: Apprentice Engineer 1 - 999 Hours | \$56.05 | \$71.31 | \$86.56 | 9th hour \$75.08 |
| Apprentice: Apprentice Engineer 1,000 - 1,999 Hours | \$58.22 | \$74.56 | \$90.90 | 10th hour \$75.08 |
| Apprentice: Apprentice Engineer 2,000 - 2,999 Hours | \$60.56 | \$78.07 | \$95.58 | Beyond 10 hours \$96.62 |
| Apprentice: Apprentice Engineer 3,000 - 3,999 hours | \$62.58 | \$81.11 | \$99.62 | Saturday |
| Apprentice: Apprentice Engineer 4,000 - 4,999 hours | \$64.77 | \$84.39 | \$104.00 | First 8 hours \$75.08 |
| Apprentice: Apprentice Engineer 4,999 - 5,999 hours | \$68.03 | \$89.28 | \$110.52 | 9th hour \$118.16 |
| | | | | 10th hour \$118.16 |
| | | | | Beyond 10 hours \$118.16 |
| | | | | Sunday/Holiday \$118.16 |

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Overtime Rate Comment: Monday-Friday-Double time after 12hrs/day
Saturday-Double time starts after 40 hrs otherwise first 8 are time and a half

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|---|---------------------------|-------------------|
| Operating Engineer-Compressor or Welding Machine | Operating Engineer | 08/01/2024 |

Classification Description: Engineer operating Compressor or Welding Machine

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$60.11 | \$77.40 | \$94.68 |

Overtime Provisions

| Over 8-hour day/40-hour week | |
|-------------------------------------|---------|
| 9th hour | \$60.11 |
| 10th hour | \$60.11 |
| Beyond 10 hours | \$90.17 |
| Saturday | |
| First 8 hours | \$60.11 |
| 9th hour | \$90.17 |
| 10th hour | \$90.17 |
| Beyond 10 hours | \$90.17 |
| Sunday/Holiday | |
| | \$90.17 |

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Overtime Rate Comment: Monday-Friday-Double time after 12hrs/day
Saturday-Double time starts after 40 hrs otherwise first 8 are time and a half

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|------------------------------------|---------------------------|-------------------|
| Operating Engineer-Forklift | Operating Engineer | 08/01/2024 |

Classification Description: Lull or Extend-A-Boom Forklift

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$67.42 | \$88.36 | \$109.30 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|----------|
| 9th hour | \$67.42 |
| 10th hour | \$67.42 |
| Beyond 10 hours | \$103.84 |

Saturday

| | |
|-----------------|----------|
| First 8 hours | \$67.42 |
| 9th hour | \$103.84 |
| 10th hour | \$103.84 |
| Beyond 10 hours | \$103.84 |

Sunday/Holiday

| | |
|--|----------|
| | \$103.84 |
|--|----------|

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Overtime Rate Comment: Monday-Friday-Double time after 12hrs/day
Saturday-Double time starts after 40 hrs otherwise first 8 are time and a half

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|-------------------------------|---------------------------|-------------------|
| Regular Crane Operator | Operating Engineer | 08/01/2024 |

Classification Description: Job Mechanic, Concrete Pump with Boom, and High/Long Reach Shear

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$70.10 | \$92.38 | \$114.66 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|---------|
| 9th hour | \$70.10 |
| 10th hour | \$70.10 |
| Beyond 10 hours | \$89.47 |

Saturday

| | |
|-----------------|----------|
| First 8 hours | \$89.47 |
| 9th hour | \$108.85 |
| 10th hour | \$108.85 |
| Beyond 10 hours | \$108.85 |

Sunday/Holiday

| | |
|--|----------|
| | \$108.85 |
|--|----------|

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Overtime Rate Comment: Monday-Friday-Double time after 12hrs/day
Saturday-Double time starts after 40 hrs otherwise first 8 are time and a half

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|-------------------------|---------------------------|-------------------|
| Regular Engineer | Operating Engineer | 08/01/2024 |

Classification Description: Hydro Excavator, Remote Controlled Concrete Breaker, and Concrete Saw operator

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$69.13 | \$90.93 | \$112.72 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|---------|
| 9th hour | \$69.13 |
| 10th hour | \$69.13 |
| Beyond 10 hours | \$88.08 |

Saturday

| | |
|-----------------|----------|
| First 8 hours | \$69.13 |
| 9th hour | \$107.03 |
| 10th hour | \$107.03 |
| Beyond 10 hours | \$107.03 |

| | |
|-----------------------|-----------------|
| Sunday/Holiday | \$107.03 |
|-----------------------|-----------------|

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Overtime Rate Comment: Monday-Friday-Double time after 12hrs/day
Saturday-Double time starts after 40 hrs otherwise first 8 are time and a half

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|---|---|-------------------|
| Marine Construction and Dredging Class I - OE324 | Operating Engineer - Marine Construction | 01/16/2025 |

Classification Description: Craft Foreman, Diver/Wet Tender, Engineer, Engineer (hydraulic dredge), Blaster

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$84.30 | \$110.05 | \$135.80 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|----------|
| 9th hour | \$110.05 |
| 10th hour | \$110.05 |
| Beyond 10 hours | \$110.05 |

Saturday

| | |
|-----------------|----------|
| First 8 hours | \$110.05 |
| 9th hour | \$110.05 |
| 10th hour | \$110.05 |
| Beyond 10 hours | \$110.05 |

| | |
|-----------------------|-----------------|
| Sunday/Holiday | \$135.80 |
|-----------------------|-----------------|

Four 10-hour days allowed? - No

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|--|---|-------------------|
| Marine Construction and Dredging Class II A - OE324 | Operating Engineer - Marine Construction | 01/16/2025 |

Classification Description: Crane, Backhoe, Material Handler, All Self-Propelled Drill Rigs, Mechanic/Welder, Asst. Engineer (hydraulic dredge), Leverman (hydraulic dredge), Diver Tender.

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$82.80 | \$107.80 | \$132.80 |

Overtime Provisions

| Over 8-hour day/40-hour week | |
|-------------------------------------|----------|
| 9th hour | \$107.80 |
| 10th hour | \$107.80 |
| Beyond 10 hours | \$107.80 |
| Saturday | |
| First 8 hours | \$107.80 |
| 9th hour | \$107.80 |
| 10th hour | \$107.80 |
| Beyond 10 hours | \$107.80 |
| Sunday/Holiday | |
| | \$132.80 |

Four 10-hour days allowed? - No

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|--|---|-------------------|
| Marine Construction and Dredging Class II B - OE324 | Operating Engineer - Marine Construction | 01/16/2025 |

Classification Description: Friction, Lattice Boom, or Crane License Cert., Endorse Tug or Tow Boat Operator

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$85.80 | \$112.30 | \$138.80 |

Overtime Provisions

| Over 8-hour day/40-hour week | |
|-------------------------------------|----------|
| 9th hour | \$112.30 |
| 10th hour | \$112.30 |
| Beyond 10 hours | \$112.30 |
| Saturday | |
| First 8 hours | \$112.30 |
| 9th hour | \$112.30 |
| 10th hour | \$112.30 |
| Beyond 10 hours | \$112.30 |
| Sunday/Holiday | |
| | \$138.80 |

Four 10-hour days allowed? - No

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|---|---|-------------------|
| Marine Construction and Dredging Class III - OE324 | Operating Engineer - Marine Construction | 01/16/2025 |

Classification Description: Deck Equipment Operator, (Machineryman), Maintenance of Crane, Tug/Launch Operator, Loader/Dozer on Barge, Deck Machinery, etc.

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$78.30 | \$101.05 | \$123.80 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|----------|
| 9th hour | \$101.05 |
| 10th hour | \$101.05 |
| Beyond 10 hours | \$101.05 |

Saturday

| | |
|-----------------|----------|
| First 8 hours | \$101.05 |
| 9th hour | \$101.05 |
| 10th hour | \$101.05 |
| Beyond 10 hours | \$101.05 |

| | |
|-----------------------|-----------------|
| Sunday/Holiday | \$123.80 |
|-----------------------|-----------------|

Four 10-hour days allowed? - No

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|--|---|-------------------|
| Marine Construction and Dredging Class IV - OE324 | Operating Engineer - Marine Construction | 01/16/2025 |

Classification Description: Deck Equipment Operator, Machineryman/Fireman, (4 equipment units or more), Off Road Trucks, Deck Hand, Tug/Engineer, Crane Maint. (50 ton and under/Backhoe 115,000 lbs. or less), Asst. Tug Operator, Blaster Helper.

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$73.35 | \$93.85 | \$114.35 |

Overtime Provisions

| Over 8-hour day/40-hour week | |
|------------------------------|----------|
| 9th hour | \$93.85 |
| 10th hour | \$93.85 |
| Beyond 10 hours | \$93.85 |
| Saturday | |
| First 8 hours | \$93.85 |
| 9th hour | \$93.85 |
| 10th hour | \$93.85 |
| Beyond 10 hours | \$93.85 |
| Sunday/Holiday | |
| | \$114.35 |

Four 10-hour days allowed? - No

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|----------------------------------|--------------------------------------|-------------------|
| Crane Operator - 324 B400 | Operating Engineer Steel Work | 06/20/2024 |

Classification Description: Crane Operator w/400' Boom or Longer w/Oiler

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$81.86 | \$106.37 | \$130.88 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|----------|
| 9th hour | \$106.37 |
| 10th hour | \$106.37 |
| Beyond 10 hours | \$106.37 |

Saturday

| | |
|-----------------|----------|
| First 8 hours | \$106.37 |
| 9th hour | \$106.37 |
| 10th hour | \$106.37 |
| Beyond 10 hours | \$106.37 |

| | |
|-----------------------|-----------------|
| Sunday/Holiday | \$130.88 |
|-----------------------|-----------------|

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Overtime Rate Comment: Double time over 12 hours Mon-Sat

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|--------------------------------------|--------------------------------------|-------------------|
| Operating Engineer - 324 A300 | Operating Engineer Steel Work | 06/20/2024 |

Classification Description: Crane with boom & jib or leads 300' or longer
Work in excess of 12 per day M-F shall be paid at double time.

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$79.36 | \$102.78 | \$126.20 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|----------|
| 9th hour | \$102.78 |
| 10th hour | \$102.78 |
| Beyond 10 hours | \$102.78 |

Saturday

| | |
|-----------------|----------|
| First 8 hours | \$102.78 |
| 9th hour | \$102.78 |
| 10th hour | \$102.78 |
| Beyond 10 hours | \$102.78 |

| | |
|-----------------------|-----------------|
| Sunday/Holiday | \$126.20 |
|-----------------------|-----------------|

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Overtime Rate Comment: Double time over 12 hours Mon-Sat.

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|--------------------------------------|--------------------------------------|-------------------|
| Operating Engineer - 324 A400 | Operating Engineer Steel Work | 06/20/2024 |

Classification Description: Crane with boom & jib or leads 400' or longer
 Work in excess of 12 per day M-F shall be paid at double time.

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$80.86 | \$104.94 | \$129.01 |

Overtime Provisions

| Over 8-hour day/40-hour week | |
|-------------------------------------|----------|
| 9th hour | \$104.93 |
| 10th hour | \$104.93 |
| Beyond 10 hours | \$104.93 |
| Saturday | |
| First 8 hours | \$104.93 |
| 9th hour | \$104.93 |
| 10th hour | \$104.93 |
| Beyond 10 hours | \$104.93 |
| Sunday/Holiday | |
| | \$129.01 |

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Overtime Rate Comment: Double time over 12 hours/day Mon-Sat

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|-------------------------------------|--------------------------------------|-------------------|
| Operating Engineer - 324 A50 | Operating Engineer Steel Work | 06/20/2024 |

Classification Description: Tower Crane & Derrick Operator 50' or More

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$77.14 | \$99.59 | \$122.05 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|---------|
| 9th hour | \$99.59 |
| 10th hour | \$99.59 |
| Beyond 10 hours | \$99.59 |

Saturday

| | |
|-----------------|---------|
| First 8 hours | \$99.59 |
| 9th hour | \$99.59 |
| 10th hour | \$99.59 |
| Beyond 10 hours | \$99.59 |

| | |
|-----------------------|-----------------|
| Sunday/Holiday | \$122.05 |
|-----------------------|-----------------|

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Overtime Rate Comment: Double time after 12 Mon-Sat

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|--------------------------------------|--------------------------------------|-------------------|
| Operating Engineer - 324 B140 | Operating Engineer Steel Work | 06/20/2024 |

Classification Description: Crane Operator w/140' of /Boom or Longer w/Oiler

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$78.59 | \$101.68 | \$124.76 |

Overtime Provisions

| Over 8-hour day/40-hour week | |
|-------------------------------------|----------|
| 9th hour | \$101.67 |
| 10th hour | \$101.67 |
| Beyond 10 hours | \$101.67 |
| Saturday | |
| First 8 hours | \$101.67 |
| 9th hour | \$101.67 |
| 10th hour | \$101.67 |
| Beyond 10 hours | \$101.67 |
| Sunday/Holiday | |
| | \$124.76 |

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Overtime Rate Comment: Double time after 12 Mon-Sat

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|--------------------------------------|--------------------------------------|-------------------|
| Operating Engineer - 324 B220 | Operating Engineer Steel Work | 06/20/2024 |

Classification Description: Crane Operator w/220' of Boom or Longer w/Oiler

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$78.86 | \$100.76 | \$123.97 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|----------|
| 9th hour | \$102.06 |
| 10th hour | \$102.06 |
| Beyond 10 hours | \$102.06 |

Saturday

| | |
|-----------------|----------|
| First 8 hours | \$102.06 |
| 9th hour | \$102.06 |
| 10th hour | \$102.06 |
| Beyond 10 hours | \$102.06 |

| | |
|-----------------------|-----------------|
| Sunday/Holiday | \$125.27 |
|-----------------------|-----------------|

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Overtime Rate Comment: Double time after 12 hours Mon-Sat

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|--------------------------------------|--------------------------------------|-------------------|
| Operating Engineer - 324 B300 | Operating Engineer Steel Work | 06/20/2024 |

Classification Description: Crane Operator w/300' of Boom or Longer w/Oiler

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$80.36 | \$104.22 | \$128.07 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|----------|
| 9th hour | \$104.22 |
| 10th hour | \$104.22 |
| Beyond 10 hours | \$104.22 |

Saturday

| | |
|-----------------|----------|
| First 8 hours | \$104.22 |
| 9th hour | \$104.22 |
| 10th hour | \$104.22 |
| Beyond 10 hours | \$104.22 |

| | |
|-----------------------|-----------------|
| Sunday/Holiday | \$128.07 |
|-----------------------|-----------------|

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Overtime Rate Comment: Double time over 12 hours Mon-Sat

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|-------------------------------------|--------------------------------------|-------------------|
| Operating Engineer - 324 B50 | Operating Engineer Steel Work | 06/20/2024 |

Classification Description: Tower Crane & Derrick Operator 50' or more w/Oiler

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$78.14 | \$101.03 | \$123.92 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|----------|
| 9th hour | \$101.03 |
| 10th hour | \$101.03 |
| Beyond 10 hours | \$101.03 |

Saturday

| | |
|-----------------|----------|
| First 8 hours | \$101.03 |
| 9th hour | \$101.03 |
| 10th hour | \$101.03 |
| Beyond 10 hours | \$101.03 |

| | |
|-----------------------|-----------------|
| Sunday/Holiday | \$123.92 |
|-----------------------|-----------------|

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Overtime Rate Comment: Double time after 12 Mon-Sat

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|--|--------------------------------------|-------------------|
| Operating Engineer - 324 PRE60118 | Operating Engineer Steel Work | 06/20/2024 |

Classification Description: Oiler/pumps over 6" **Applies to Operators who have previously worked under this classification PRIOR to 6/1/18**

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$61.22 | \$76.76 | \$92.29 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|---------|
| 9th hour | \$76.75 |
| 10th hour | \$76.75 |
| Beyond 10 hours | \$76.75 |

Saturday

| | |
|-----------------|---------|
| First 8 hours | \$76.75 |
| 9th hour | \$76.75 |
| 10th hour | \$76.75 |
| Beyond 10 hours | \$76.75 |

| | |
|-----------------------|----------------|
| Sunday/Holiday | \$92.29 |
|-----------------------|----------------|

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Overtime Rate Comment: Double time after 12 Mon-Sat

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|--------------------------------|--------------------------------------|-------------------|
| Operating Engineer - EF | Operating Engineer Steel Work | 05/10/2024 |

Classification Description: Extended boom forklift over 5,000 lb capacity, 1 Drum Hoist

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$72.21 | \$92.53 | \$112.84 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|----------|
| 9th hour | \$92.53 |
| 10th hour | \$92.53 |
| Beyond 10 hours | \$112.84 |

Saturday

| | |
|-----------------|----------|
| First 8 hours | \$92.53 |
| 9th hour | \$92.53 |
| 10th hour | \$92.53 |
| Beyond 10 hours | \$112.84 |

| | |
|-----------------------|-----------------|
| Sunday/Holiday | \$112.84 |
|-----------------------|-----------------|

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

4 10s allowed M-Th with Friday makeup day because of bad weather

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|--|--------------------------------------|-------------------|
| Operating Engineer Steel Work - SW120 | Operating Engineer Steel Work | 05/10/2024 |

Classification Description: Crane w/ 120' boom or longer

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$74.14 | \$95.24 | \$116.33 |

Overtime Provisions

| Over 8-hour day/40-hour week | |
|-------------------------------------|----------|
| 9th hour | \$95.24 |
| 10th hour | \$95.24 |
| Beyond 10 hours | \$116.33 |
| Saturday | |
| First 8 hours | \$95.24 |
| 9th hour | \$95.24 |
| 10th hour | \$95.24 |
| Beyond 10 hours | \$116.33 |
| Sunday/Holiday | |
| | \$116.33 |

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

4 10s allowed M-Th with Friday makeup day because of bad weather

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|--|--------------------------------------|-------------------|
| Operating Engineer Steel Work - SW120 | Operating Engineer Steel Work | 05/10/2024 |

Classification Description: Crane w/ 120' boom or longer w/ Oiler

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$75.01 | \$96.54 | \$118.07 |

Overtime Provisions

| Over 8-hour day/40-hour week | |
|-------------------------------------|----------|
| 9th hour | \$96.54 |
| 10th hour | \$96.54 |
| Beyond 10 hours | \$118.07 |
| Saturday | |
| First 8 hours | \$96.54 |
| 9th hour | \$96.54 |
| 10th hour | \$96.54 |
| Beyond 10 hours | \$118.07 |
| Sunday/Holiday | |
| | \$118.07 |

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

4 10s allowed M-Th with Friday makeup day because of bad weather

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|--|--------------------------------------|-------------------|
| Operating Engineer Steel Work - SW140 | Operating Engineer Steel Work | 05/10/2024 |

Classification Description: Crane w/ 140' boom or longer

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$75.19 | \$96.80 | \$118.41 |

Overtime Provisions

| Over 8-hour day/40-hour week | |
|-------------------------------------|----------|
| 9th hour | \$96.80 |
| 10th hour | \$96.80 |
| Beyond 10 hours | \$118.41 |
| Saturday | |
| First 8 hours | \$96.80 |
| 9th hour | \$96.80 |
| 10th hour | \$96.80 |
| Beyond 10 hours | \$118.41 |
| Sunday/Holiday | |
| | \$118.41 |

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

4 10s allowed M-Th with Friday makeup day because of bad weather

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|--|--------------------------------------|-------------------|
| Operating Engineer Steel Work - SW140 | Operating Engineer Steel Work | 05/10/2024 |

Classification Description: Crane w/ 140' boom or longer W/ Oiler

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$76.19 | \$98.24 | \$120.28 |

Overtime Provisions

| Over 8-hour day/40-hour week | |
|-------------------------------------|----------|
| 9th hour | \$98.24 |
| 10th hour | \$98.24 |
| Beyond 10 hours | \$120.28 |
| Saturday | |
| First 8 hours | \$98.24 |
| 9th hour | \$98.24 |
| 10th hour | \$98.24 |
| Beyond 10 hours | \$120.28 |
| Sunday/Holiday | |
| | \$120.28 |

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

4 10s allowed M-Th with Friday makeup day because of bad weather

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|--|--------------------------------------|-------------------|
| Operating Engineer Steel Work - SW220 | Operating Engineer Steel Work | 05/10/2024 |

Classification Description: Boom & Jib 220' or longer

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$76.46 | \$98.62 | \$120.78 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|----------|
| 9th hour | \$98.62 |
| 10th hour | \$98.62 |
| Beyond 10 hours | \$120.78 |

Saturday

| | |
|-----------------|----------|
| First 8 hours | \$98.62 |
| 9th hour | \$98.62 |
| 10th hour | \$98.62 |
| Beyond 10 hours | \$120.78 |

| | |
|-----------------------|-----------------|
| Sunday/Holiday | \$120.78 |
|-----------------------|-----------------|

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

4 10s allowed M-Th with Friday makeup day because of bad weather

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|--|--------------------------------------|-------------------|
| Operating Engineer Steel Work - SW220 | Operating Engineer Steel Work | 05/10/2024 |

Classification Description: Crane w/ 220' boom or longer w/ Oiler

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$74.01 | \$95.11 | \$116.20 |

Overtime Provisions

| Over 8-hour day/40-hour week | |
|-------------------------------------|----------|
| 9th hour | \$95.11 |
| 10th hour | \$95.11 |
| Beyond 10 hours | \$116.20 |
| Saturday | |
| First 8 hours | \$95.11 |
| 9th hour | \$95.11 |
| 10th hour | \$95.11 |
| Beyond 10 hours | \$116.20 |
| Sunday/Holiday | |
| | \$116.20 |

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

4 10s allowed M-Th with Friday makeup day because of bad weather

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|--|--------------------------------------|-------------------|
| Operating Engineer Steel Work - SW300 | Operating Engineer Steel Work | 05/10/2024 |

Classification Description: Boom & Jib 300' or longer

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$76.96 | \$99.34 | \$121.72 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|----------|
| 9th hour | \$99.34 |
| 10th hour | \$99.34 |
| Beyond 10 hours | \$121.72 |

Saturday

| | |
|-----------------|----------|
| First 8 hours | \$99.34 |
| 9th hour | \$99.34 |
| 10th hour | \$99.34 |
| Beyond 10 hours | \$121.72 |

| | |
|-----------------------|-----------------|
| Sunday/Holiday | \$121.72 |
|-----------------------|-----------------|

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

4 10s allowed M-Th with Friday makeup day because of bad weather

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|--|--------------------------------------|-------------------|
| Operating Engineer Steel Work - SW300 | Operating Engineer Steel Work | 05/10/2024 |

Classification Description: Crane w/ 300' boom or longer w/ Oiler

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$77.96 | \$100.78 | \$123.59 |

Overtime Provisions

| Over 8-hour day/40-hour week | |
|-------------------------------------|----------|
| 9th hour | \$100.78 |
| 10th hour | \$100.78 |
| Beyond 10 hours | \$123.59 |
| Saturday | |
| First 8 hours | \$100.78 |
| 9th hour | \$100.78 |
| 10th hour | \$100.78 |
| Beyond 10 hours | \$123.59 |
| Sunday/Holiday | |
| | \$123.59 |

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

4 10s allowed M-Th with Friday makeup day because of bad weather

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|--|--------------------------------------|-------------------|
| Operating Engineer Steel Work - SW400 | Operating Engineer Steel Work | 05/10/2024 |

Classification Description: Boom & Jib 400' or longer

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$78.46 | \$101.49 | \$124.52 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|----------|
| 9th hour | \$101.49 |
| 10th hour | \$101.49 |
| Beyond 10 hours | \$124.52 |

Saturday

| | |
|-----------------|----------|
| First 8 hours | \$101.49 |
| 9th hour | \$101.49 |
| 10th hour | \$101.49 |
| Beyond 10 hours | \$124.52 |

Sunday/Holiday

\$124.52

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

4 10s allowed M-Th with Friday makeup day because of bad weather

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|--|--------------------------------------|-------------------|
| Operating Engineer Steel Work - SW400 | Operating Engineer Steel Work | 05/10/2024 |

Classification Description: Crane w/ 400' boom or longer w/ Oiler

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$79.46 | \$102.93 | \$126.39 |

Overtime Provisions

| Over 8-hour day/40-hour week | |
|-------------------------------------|----------|
| 9th hour | \$102.93 |
| 10th hour | \$102.93 |
| Beyond 10 hours | \$126.39 |
| Saturday | |
| First 8 hours | \$102.93 |
| 9th hour | \$102.93 |
| 10th hour | \$102.93 |
| Beyond 10 hours | \$126.39 |
| Sunday/Holiday | |
| | \$126.39 |

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

4 10s allowed M-Th with Friday makeup day because of bad weather

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|---|--------------------------------------|-------------------|
| Operating Engineer Steel Work - SWCO | Operating Engineer Steel Work | 05/10/2024 |

Classification Description: Crane Operator, Job Mechanic, 3 Drum Hoist & Excavator

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$73.65 | \$94.59 | \$115.53 |
| Apprentice: 0-999 hours | \$59.16 | \$76.02 | \$92.88 |
| Apprentice: 1,000-1,999 hours | \$61.56 | \$79.63 | \$97.68 |
| Apprentice: 2,000-2,999 hours | \$63.96 | \$83.22 | \$102.48 |
| Apprentice: 3,000-3,999 hours | \$66.38 | \$84.18 | \$101.98 |
| Apprentice: 4,000-4,999 hours | \$68.78 | \$90.46 | \$112.12 |
| Apprentice: 5,000 hours | \$71.20 | \$91.09 | \$110.99 |

Overtime Provisions

| Over 8-hour day/40-hour week | |
|-------------------------------------|----------|
| 9th hour | \$94.59 |
| 10th hour | \$94.59 |
| Beyond 10 hours | \$115.53 |
| Saturday | |
| First 8 hours | \$94.59 |
| 9th hour | \$94.59 |
| 10th hour | \$94.59 |
| Beyond 10 hours | \$115.53 |
| Sunday/Holiday | |
| | \$115.53 |

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

4 10s allowed M-Th with Friday makeup day because of bad weather

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|---|--------------------------------------|-------------------|
| Operating Engineer Steel Work - SWCO-O | Operating Engineer Steel Work | 05/10/2024 |

Classification Description: Crane Operator w/ Oiler

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$74.65 | \$96.03 | \$117.40 |

Overtime Provisions

| Over 8-hour day/40-hour week | |
|-------------------------------------|----------|
| 9th hour | \$96.03 |
| 10th hour | \$96.03 |
| Beyond 10 hours | \$117.40 |
| Saturday | |
| First 8 hours | \$96.03 |
| 9th hour | \$96.03 |
| 10th hour | \$96.03 |
| Beyond 10 hours | \$117.40 |
| Sunday/Holiday | |
| | \$117.40 |

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

4 10s allowed M-Th with Friday makeup day because of bad weather

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|---|--------------------------------------|-------------------|
| Operating Engineer Steel Work - SWCW | Operating Engineer Steel Work | 05/10/2024 |

Classification Description: Compressor or Welder Operator

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$37.03 | \$49.48 | \$61.92 |

Overtime Provisions

| Over 8-hour day/40-hour week | |
|-------------------------------------|---------|
| 9th hour | \$47.85 |
| 10th hour | \$47.85 |
| Beyond 10 hours | \$58.67 |
| Saturday | |
| First 8 hours | \$47.85 |
| 9th hour | \$47.85 |
| 10th hour | \$47.85 |
| Beyond 10 hours | \$58.67 |
| Sunday/Holiday | |
| | \$58.67 |

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

4 10s allowed M-Th with Friday makeup day because of bad weather

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|---|--------------------------------------|-------------------|
| Operating Engineer Steel Work - SWHO | Operating Engineer Steel Work | 05/10/2024 |

Classification Description: Hoisting Operator, 2 Drum Hoist, & Rubber Tire Backhoe

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$73.01 | \$93.67 | \$114.33 |

Overtime Provisions

| Over 8-hour day/40-hour week | |
|-------------------------------------|----------|
| 9th hour | \$93.67 |
| 10th hour | \$93.67 |
| Beyond 10 hours | \$114.33 |
| Saturday | |
| First 8 hours | \$93.67 |
| 9th hour | \$93.67 |
| 10th hour | \$93.67 |
| Beyond 10 hours | \$114.33 |
| Sunday/Holiday | |
| | \$114.33 |

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

4 10s allowed M-Th with Friday makeup day because of bad weather

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|--|--------------------------------------|-------------------|
| Operating Engineer Steel Work - SWO | Operating Engineer Steel Work | 05/10/2024 |

Classification Description: Oiler

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$53.42 | \$67.61 | \$81.80 |

Overtime Provisions

| Over 8-hour day/40-hour week | |
|-------------------------------------|---------|
| 9th hour | \$65.74 |
| 10th hour | \$65.74 |
| Beyond 10 hours | \$78.06 |
| Saturday | |
| First 8 hours | \$65.74 |
| 9th hour | \$65.74 |
| 10th hour | \$65.74 |
| Beyond 10 hours | \$78.06 |
| Sunday/Holiday | |
| | \$78.06 |

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

4 10s allowed M-Th with Friday makeup day because of bad weather

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|---|--------------------------------------|-------------------|
| Operating Engineer Steel Work - SWTD50 | Operating Engineer Steel Work | 05/10/2024 |

Classification Description: Tower Crane & Derrick where work is 50' or more

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$74.74 | \$96.16 | \$117.57 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|----------|
| 9th hour | \$96.16 |
| 10th hour | \$96.16 |
| Beyond 10 hours | \$117.57 |

Saturday

| | |
|-----------------|----------|
| First 8 hours | \$96.16 |
| 9th hour | \$96.16 |
| 10th hour | \$96.16 |
| Beyond 10 hours | \$117.57 |

| | |
|-----------------------|-----------------|
| Sunday/Holiday | \$117.57 |
|-----------------------|-----------------|

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

4 10s allowed M-Th with Friday makeup day because of bad weather

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|---|--------------------------------------|-------------------|
| Operating Engineer Steel Work - SWTD50 O | Operating Engineer Steel Work | 05/10/2024 |

Classification Description: Tower Crane & Derrick 50' or more w/ Oiler

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$75.84 | \$97.69 | \$119.54 |

Overtime Provisions

| Over 8-hour day/40-hour week | |
|-------------------------------------|----------|
| 9th hour | \$97.69 |
| 10th hour | \$97.69 |
| Beyond 10 hours | \$119.54 |
| Saturday | |
| First 8 hours | \$97.69 |
| 9th hour | \$97.69 |
| 10th hour | \$97.69 |
| Beyond 10 hours | \$119.54 |
| Sunday/Holiday | |
| | \$119.54 |

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

4 10s allowed M-Th with Friday makeup day because of bad weather

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|--|---|-------------------|
| Operating Engineer Underground-324- Class I | Operating Engineer Underground | 10/31/2024 |

Classification Description: Class I Equipment--Air Compressors in Manifold with throttle valve Auto Grade or similar type machine
Backfill Tamper Backhoe
Backhoe on Farm Type Tractor 45 H.P. & over. Ballast Regulator (R.R.)
Batch Plant (concrete - central mix) Batch Plant Operator (concrete) Blade Grader Operator
Bulldozer
Caisson Drilling Machine Cherry Picker--15 ton or over Clamshell
Concrete/Asphalt Saw Operator - Power Driven (3yrs experience or more) Concrete Belt Placer (Formless)
Concrete Cure/Finish Machine Operator
Concrete Mixer 21 cu. ft. or over Concrete Paver [two (2) drums or larger] Concrete Pump (Truck Mount)
Concrete Pump (3 inch and over) Concrete Pump with Boom Operator Conveyor Loader Operator (Euclid type) Core Drilling
Machine
Crane (Crawler, truck type or pile driving)
Crane or De1Tick with any attachment incl. clamshell, dragline, shovel, backhoe, etc. Directional Drill/Boring Machine Operator
Dozer Dragline
Dredge Engineer Dredge Operator
Drilling Machine on which the drill is an integral part
Earth Mover--rubber tired--(paddle wheel, 619, 631, TS-24 or similar type) Earth Mover rubber tired--tandem (\$.50 cents per hr.
added for each bowl) Elevating
Grader Operator
End Loader
End Loader Operator (1½ yard capacity and over)
Excavator
Farm type tractor with attached pan
Finishing Machine Operator (Asphalt or Concrete) Foreman/Operating Engineer
Forklift (10 ton or over)
GPS or Electronic Grade on motorized equipment Gradall and similar type machine
Grader
Gravel Processing plant (portable) Operator of Guard Rail Post Driver Haul Units (off-highway) Helicopter crew
Highlift Shovel--1-1 /2 cu. yd. or over Hoisting Engineer
Horizontal Directional Drill Hydraulic Boom Truck
Hydro demolition equipment (water blaster) Hydro Excavator
Loader--Self-propelled (Belt-Chain- Wheel) (Holland or similar type) Locomotive and/or Dinkey Engine
Mechanic Milling Machine
Mucking Machine
Operator of Guard Rail Post Driver Paver Operator - Concrete
Pile Driver--Skid or Crawler Power Shovel
Rock Breaking Plant
Rock Crushing Plant (Portable)
Root Rake, Tractor Mounted Sand Blaster Vacuum Roto Mill
Scraper Self-Propelled or Tractor Drawn

Self-propelled Widener or Gravel distributing shoulder machine Shovel Operator
 Side Boom Tractor (type D-4 or equivalent or larger) Slope Paver
 Stump Remover Tractor Mounted Surface Heater & Planer
 Surface Roller with Dozer Blade
 Swinging Boom Truck (over 12-ton capacity) Tilling Machine or (Roto Grader)
 Tractor Operator
 Tractor--Boom, Winch or Hoe Head Tractor--Push
 Tractor with Scoop Tractor Mounted Spreader Tree Mover
 Trench Machine (ladder or wheel type) Trencher (over 8ft. digging capacity) Tugboat Operator
 Tunnel Boring Machine Tunnel Shield
 Vacuum Machine/Truck Operator Well Drilling Machine
 Well Drilling Rig
 Winch Truck with A Frame

| Wage Rates | Straight Time | Time and a Half | Double Time |
|---|---------------|-----------------|-------------|
| Total Hourly Wage | \$68.12 | \$87.01 | \$105.89 |
| Apprentice: Apprentice Engineer 0-999 hours | \$54.36 | \$69.57 | \$84.77 |
| Apprentice: Apprentice Engineer 1,000-1,999 hours | \$56.53 | \$72.83 | \$89.11 |
| Apprentice: Apprentice Engineer 2,000-2,999 hours | \$58.69 | \$76.06 | \$93.43 |
| Apprentice: Apprentice Engineer 3,000-3,999 hours | \$60.87 | \$79.33 | \$97.79 |
| Apprentice: Apprentice Engineer 4,000-4,999 hours | \$64.22 | \$84.36 | \$104.49 |
| Apprentice: Apprentice Engineer 5,000-5,999 hours | \$65.06 | \$85.62 | \$106.17 |

Overtime Provisions

| Over 8-hour day/40-hour week | |
|-------------------------------------|----------|
| 9th hour | \$87.00 |
| 10th hour | \$87.00 |
| Beyond 10 hours | \$87.00 |
| Saturday | |
| First 8 hours | \$87.00 |
| 9th hour | \$87.00 |
| 10th hour | \$87.00 |
| Beyond 10 hours | \$87.00 |
| Sunday/Holiday | |
| | \$105.89 |

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

In the event work is unable to be performed on account of weather Monday through Thursday, then Friday work may be scheduled for the ten (10) hours, at straight-time.

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|---|---|-------------------|
| Operating Engineer Underground-324- Class II | Operating Engineer Underground | 10/31/2024 |

Classification Description: Class II Equipment

Air Compressor with Throttle Valve or Clever Brooks type comb. Backhoe (with 3/8-yard bucket or less)

Backhoe on Farm Type Tractor under 45 H.P.

Batch Plant (concrete-dry batch)

Boom Truck (power swing type boom)

Cherry Picker under 15 ton

Crusher

Crusher Operator

Concrete Pump

Concrete Mesh Depressor--independently operated Concrete Spreader--Power Driven

End Dumps when operated by an Operating Engineer End Loader under 1-1/2 cu yd.

Gunite Machine

Head Greaser

Hoist

Lowboy Operator

Mesh or Steel Placer (motorized)

Multiple Tamping Machine (R.R.)

Power Curing Spraying Machine (Formless)

P.C.C. Concrete Belt Placer (form type)

Pull Grader--Power Control

Pump Operator (6" discharge or over, gas diesel, powered or generator of 300 amp or larger)

Refrigerating Machine--Freezing operation Ross Carrier

Self-propelled convey transfer devise. Sheepfoot Roller (self-propelled)

Side Boom Tractor (smaller than D-4 type or equivalent)

Sweeper (Wayne type and similar equipment)

Telescoping laser finish machine (laser screed)

Tractor (pneu-tired, other than backhoe or front-end loader)

Trencher (8ft. digging capacity and smaller)

Trench Machine 24" and under

Tube Float (motorized)

Vac Truck

Washing Plant Operator Welder

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$64.00 | \$83.38 | \$102.75 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|---------|
| 9th hour | \$80.82 |
| 10th hour | \$80.82 |
| Beyond 10 hours | \$80.82 |

Saturday

| | |
|-----------------|---------|
| First 8 hours | \$80.82 |
| 9th hour | \$80.82 |
| 10th hour | \$80.82 |
| Beyond 10 hours | \$80.82 |

| | |
|-----------------------|----------------|
| Sunday/Holiday | \$97.65 |
|-----------------------|----------------|

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

In the event work is unable to be performed on account of weather Monday through Thursday, then Friday work may be scheduled for the ten (10) hours, at straight-time.

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|--|---|-------------------|
| Operating Engineer Underground-324- Class III | Operating Engineer Underground | 10/31/2024 |

Classification Description: Class III Equipment

- Air Compressor (600 CFM or larger)
- Air Compressor [two (2) or more - less than 600 CFM] Base Paver (Jersey or similar type machine)
- Boom Truck (Non swinging, Non powered type boom) Concrete Breaker
- Concrete Finishing Machine
- Concrete Paver (1 drum - 1/2 yard or larger) Curb Machine
- Elevator (other than passenger) Hoist (one drum)
- Jacks - Hydraulic Power-driven multiple jack system Maintenance Man
- Mechanics Helper Paving Breaker
- Power Broom Self-propelled
- Pump [two (2) or more 4 inch up to 6-inch discharge gas or diesel powered-excluding submersible pumps)
- Pumpcrete Machine and similar equipment Roller (Earth & Sub-base material) Screening Plant Operator
- Spike Machine (R.R.)
- Tamper-Multiple Vibrating-Earth and Sub-base material Tractor with Drill--50 H.P. or over Well Point System Wagon Drill (multiple)
- Welding Machine or Generator [two (2) or more 300 amp. Or larger -gas or diesel powered]
- Well Point System
- Widener (Apsco or similar type)

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$63.27 | \$82.28 | \$101.29 |

Overtime Provisions

| Over 8-hour day/40-hour week | |
|-------------------------------------|---------|
| 9th hour | \$79.78 |
| 10th hour | \$79.78 |
| Beyond 10 hours | \$79.78 |
| Saturday | |
| First 8 hours | \$79.78 |
| 9th hour | \$79.78 |
| 10th hour | \$79.78 |
| Beyond 10 hours | \$79.78 |
| Sunday/Holiday | |
| | \$96.29 |

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

In the event work is unable to be performed on account of weather Monday through Thursday, then Friday work may be scheduled for the ten (10) hours, at straight-time.

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|---|---|-------------------|
| Operating Engineer Underground-324- Class IV | Operating Engineer Underground | 10/31/2024 |

Classification Description: Class IV Equipment

- Air Compressor Operator (over 250 CFM)
- All Mulching Equipment
- All Walk Behind or Remote-Control Powered Equipment (autonomous equipment)
- Assistant to Engineer Automatic Dry Batch Plant
- Belt Spreader (motorized including transfer device by remote, wireless or cable) Boiler
- Boom or Winch truck operator
- Broom & Belt Machine
- Chair Cart (Self-propelled) Concrete Pumps (under 3")
- Curing Equipment Operator (self-propelled)
- Deck Hand
- Digger Post Hole (Power-driven)
- End loader Operator (under 3/4-yard capacity)
- Extend A Boom Forklift--under 10 Ton
- Farm Tractor with attachments Finishing Machine (concrete)
- Forklift under 10 ton
- Form Grader (if motorized)
- Georgia Buggy -Power wheel barrel 1 3/4 yard with a seat Generator (15 kw or greater)
- Greaser Helper
- Hydraulic pipe pushing machine Mechanical Heater
- Mechanics Helper
- Outboard or Inboard Motorboat Power Bin Operator
- Pug Mill
- Pumps - [two (2) or more up to 4 in. discharge if used three (3) hours or more a day - gas or diesel powered- excluding submersible pumps]
- Roller (other than asphalt)
- Seaman Tiller
- Skid Steer
- Stump Remover (Grinder)
- Sweeper (Wayne type and similar equipment) Tamper
- Trencher (service)
- Vibratory Compaction Equipment Operator (6 ft. wide or over)
- Walk Behind Forklift
- Water Wagon

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$62.70 | \$81.43 | \$100.15 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|---------|
| 9th hour | \$78.96 |
| 10th hour | \$78.96 |
| Beyond 10 hours | \$78.96 |

Saturday

| | |
|-----------------|---------|
| First 8 hours | \$78.96 |
| 9th hour | \$78.96 |
| 10th hour | \$78.96 |
| Beyond 10 hours | \$78.96 |

| | |
|-----------------------|----------------|
| Sunday/Holiday | \$95.22 |
|-----------------------|----------------|

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

In the event work is unable to be performed on account of weather Monday through Thursday, then Friday work may be scheduled for the ten (10) hours, at straight-time.

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|--|---|-------------------|
| Operating Engineer Underground-324- Class V | Operating Engineer Underground | 10/31/2024 |

Classification Description: Class V Equipment

Concrete/Asphalt Saw Operator- Power Driven (Less than 3 yrs. experience) Density/Soil Engineer
 Directional Boring Utility Man
 Discharge Pumps 4" or less (1 - 4 units) Dump Truck Operator
 Dumper (Wagon, Truck, Etc.) - or trade Fence Erector /Power Driven
 Guard Post Driver Operator (power driven) Hydra Seeder
 Light Plants (1 to 5 units) Oiler Fireman
 Operator of minor equip.
 Roto Mill Utility Grade Control Operator
 Scissor lifts and basket lifts where used for material hoisting
 Sign Installer/Sign Installer with Remote Control Operated Equipment
 Straw Blower or Brush Mulcher
 Top Man, And Railroad Track and Trestle Engineer Utility Engineer
 Water Blasting Utility Engineer

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$39.95 | \$53.88 | \$67.80 |

Overtime Provisions

| Over 8-hour day/40-hour week | |
|-------------------------------------|---------|
| 9th hour | \$52.06 |
| 10th hour | \$52.06 |
| Beyond 10 hours | \$52.06 |
| Saturday | |
| First 8 hours | \$52.06 |
| 9th hour | \$52.06 |
| 10th hour | \$52.06 |
| Beyond 10 hours | \$52.06 |
| Sunday/Holiday | |
| | \$64.17 |

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

In the event work is unable to be performed on account of weather Monday through Thursday, then Friday work may be scheduled for the ten (10) hours, at straight-time.

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|-----------------------------------|-------------------------------|-------------------|
| Pipe and Manhole Rehab - 1 | Pipe and Manhole Rehab | 05/10/2024 |

Classification Description: General Laborer for rehab work or normal cleaning and cctv work-top man, scaffold man, CCTV assistant, jetter-vac assistant

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$28.20 | \$38.20 | \$48.19 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|---------|
| 9th hour | \$38.20 |
| 10th hour | \$38.20 |
| Beyond 10 hours | \$38.20 |

Saturday

| | |
|-----------------|---------|
| First 8 hours | \$38.20 |
| 9th hour | \$38.20 |
| 10th hour | \$38.20 |
| Beyond 10 hours | \$38.20 |

| | |
|-----------------------|----------------|
| Sunday/Holiday | \$38.20 |
|-----------------------|----------------|

Four 10-hour days allowed? - No

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|-----------------------------------|-------------------------------|-------------------|
| Pipe and Manhole Rehab - 2 | Pipe and Manhole Rehab | 05/10/2024 |

Classification Description: Tap cutter/CCTV Tech/Grout Equipment Operator: unit driver and operator of CCTV; grouting equipment and tap cutting equipment

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$32.70 | \$44.95 | \$57.19 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|---------|
| 9th hour | \$44.95 |
| 10th hour | \$44.95 |
| Beyond 10 hours | \$44.95 |

Saturday

| | |
|-----------------|---------|
| First 8 hours | \$44.95 |
| 9th hour | \$44.95 |
| 10th hour | \$44.95 |
| Beyond 10 hours | \$44.95 |

| | |
|-----------------------|----------------|
| Sunday/Holiday | \$44.95 |
|-----------------------|----------------|

Four 10-hour days allowed? - No

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|-----------------------------------|-------------------------------|-------------------|
| Pipe and Manhole Rehab - 3 | Pipe and Manhole Rehab | 05/10/2024 |

Classification Description: CCTV Technician/Combo Unit Operator: unit driver and operator of cctv unit or combo unit in connection with normal cleaning and televising work

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$31.45 | \$43.07 | \$54.69 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|---------|
| 9th hour | \$43.07 |
| 10th hour | \$43.07 |
| Beyond 10 hours | \$43.07 |

Saturday

| | |
|-----------------|---------|
| First 8 hours | \$43.07 |
| 9th hour | \$43.07 |
| 10th hour | \$43.07 |
| Beyond 10 hours | \$43.07 |

| | |
|-----------------------|----------------|
| Sunday/Holiday | \$43.07 |
|-----------------------|----------------|

Four 10-hour days allowed? - No

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|-----------------------------------|-------------------------------|-------------------|
| Pipe and Manhole Rehab - 4 | Pipe and Manhole Rehab | 05/10/2024 |

Classification Description: Boiler Operator: unit driver and operator of steam/water heater units and all ancillary equipment associated

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$33.20 | \$45.70 | \$58.19 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|---------|
| 9th hour | \$45.70 |
| 10th hour | \$45.70 |
| Beyond 10 hours | \$45.70 |

Saturday

| | |
|-----------------|---------|
| First 8 hours | \$45.70 |
| 9th hour | \$45.70 |
| 10th hour | \$45.70 |
| Beyond 10 hours | \$45.70 |

| | |
|-----------------------|----------------|
| Sunday/Holiday | \$45.70 |
|-----------------------|----------------|

Four 10-hour days allowed? - No

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|-----------------------------------|-------------------------------|-------------------|
| Pipe and Manhole Rehab - 5 | Pipe and Manhole Rehab | 05/10/2024 |

Classification Description: Combo Unit driver & Jetter-Vac Operator

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$33.20 | \$45.70 | \$58.19 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|---------|
| 9th hour | \$45.70 |
| 10th hour | \$45.70 |
| Beyond 10 hours | \$45.70 |

Saturday

| | |
|-----------------|---------|
| First 8 hours | \$45.70 |
| 9th hour | \$45.70 |
| 10th hour | \$45.70 |
| Beyond 10 hours | \$45.70 |

Sunday/Holiday

\$45.70

Four 10-hour days allowed? - No

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|-----------------------------------|-------------------------------|-------------------|
| Pipe and Manhole Rehab - 6 | Pipe and Manhole Rehab | 05/10/2024 |

Classification Description: Pipe Bursting & Slip-lining Equipment Operator

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$34.20 | \$47.20 | \$60.19 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|---------|
| 9th hour | \$47.20 |
| 10th hour | \$47.20 |
| Beyond 10 hours | \$47.20 |

Saturday

| | |
|-----------------|---------|
| First 8 hours | \$47.20 |
| 9th hour | \$47.20 |
| 10th hour | \$47.20 |
| Beyond 10 hours | \$47.20 |

| | |
|-----------------------|----------------|
| Sunday/Holiday | \$47.20 |
|-----------------------|----------------|

Four 10-hour days allowed? - No

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|---------------------|-------------------|-------------------|
| Pipefitter | Pipefitter | 05/10/2024 |

Classification Description: Pipefitter, Steamfitter, HVAC-R mechanic

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$77.06 | \$100.47 | \$118.67 |
| Apprentice: 10th period | \$42.91 | \$57.34 | \$70.42 |
| Apprentice: 1st & 2nd periods | \$34.00 | \$43.98 | \$52.60 |
| Apprentice: 3rd period | \$35.25 | \$45.85 | \$55.10 |
| Apprentice: 4th period | \$36.25 | \$47.35 | \$57.10 |
| Apprentice: 5th period | \$36.98 | \$48.44 | \$58.56 |
| Apprentice: 6th period | \$38.23 | \$50.32 | \$61.06 |
| Apprentice: 7th period | \$39.48 | \$52.20 | \$63.56 |
| Apprentice: 8th period | \$40.48 | \$53.70 | \$65.56 |
| Apprentice: 9th period | \$41.48 | \$55.20 | \$67.56 |

Overtime Provisions

| Over 8-hour day/40-hour week | |
|-------------------------------------|----------|
| 9th hour | \$95.27 |
| 10th hour | \$95.27 |
| Beyond 10 hours | \$113.47 |
| Saturday | |
| First 8 hours | \$95.27 |
| 9th hour | \$95.27 |
| 10th hour | \$113.47 |
| Beyond 10 hours | \$113.47 |
| Sunday/Holiday | |
| | \$113.47 |

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|---------------------|----------------|-------------------|
| Plumber | Plumber | 05/10/2024 |

Classification Description: Plumber

| Wage Rates | Straight Time | Time and a Half | Double Time |
|----------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$79.32 | \$97.22 | \$115.11 |
| Apprentice: 1st Year | \$29.48 | \$38.33 | \$47.18 |
| Apprentice: 2nd Year | \$33.10 | \$42.83 | \$52.55 |
| Apprentice: 3rd Year | \$34.75 | \$45.23 | \$55.70 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|----------|
| 9th hour | \$97.22 |
| 10th hour | \$97.22 |
| Beyond 10 hours | \$115.11 |

Saturday

| | |
|-----------------|----------|
| First 8 hours | \$97.22 |
| 9th hour | \$115.11 |
| 10th hour | \$115.11 |
| Beyond 10 hours | \$115.11 |

Sunday/Holiday

| | |
|--|----------|
| | \$115.11 |
|--|----------|

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|---------------------|---------------|-------------------|
| Roofer - WOM | Roofer | 05/10/2024 |

Classification Description: Commercial Roofer

| Wage Rates | Straight Time | Time and a Half | Double Time |
|----------------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$62.82 | \$79.68 | \$96.53 |
| Apprentice: Apprentice 1 | \$48.74 | \$58.55 | \$68.37 |
| Apprentice: Apprentice 2 | \$49.25 | \$59.32 | \$69.39 |
| Apprentice: Apprentice 3 | \$50.76 | \$61.59 | \$72.41 |
| Apprentice: Apprentice 4 | \$52.26 | \$63.83 | \$75.41 |
| Apprentice: Apprentice 5 | \$53.77 | \$66.10 | \$78.43 |
| Apprentice: Apprentice 6 | \$55.18 | \$68.21 | \$81.25 |
| Apprentice: Apprentice 7 | \$56.79 | \$70.63 | \$84.47 |
| Apprentice: Apprentice 8 | \$58.27 | \$72.85 | \$87.43 |
| Apprentice: new apprentice | \$48.68 | \$58.47 | \$68.25 |

Overtime Provisions

| Over 8-hour day/40-hour week | |
|-------------------------------------|---------|
| 9th hour | \$79.68 |
| 10th hour | \$79.68 |
| Beyond 10 hours | \$79.68 |
| Saturday | |
| First 8 hours | \$79.68 |
| 9th hour | \$79.68 |
| 10th hour | \$79.68 |
| Beyond 10 hours | \$79.68 |
| Sunday/Holiday | |
| | \$96.53 |

Four 10-hour days allowed? - No

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|--|-----------------------|-------------------|
| Sewer Relining Operator - Class I | Sewer Relining | 05/10/2024 |

Classification Description: Class I-Operator of audio visual CCTV system including remote in-ground cutter and other equipment used in conjunction with CCTV system.

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$52.84 | \$69.23 | \$85.62 |
| Apprentice: 0-6 months | \$41.58 | \$54.66 | \$67.74 |
| Apprentice: 6-12 months | \$45.31 | \$60.26 | \$75.20 |

| Overtime Provisions | |
|-------------------------------------|----------------|
| Over 8-hour day/40-hour week | |
| 9th hour | \$69.23 |
| 10th hour | \$69.23 |
| Beyond 10 hours | \$69.23 |
| Saturday | |
| First 8 hours | \$69.23 |
| 9th hour | \$69.23 |
| 10th hour | \$69.23 |
| Beyond 10 hours | \$69.23 |
| Sunday/Holiday | \$85.62 |

Four 10-hour days allowed? - No

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|---|-----------------------|-------------------|
| Sewer Relining Operator - Class II | Sewer Relining | 05/10/2024 |

Classification Description: Class II-Operator of hot water heaters and circulation system; water jetters; and vacuum and mechanical debris removal systems and those assisting.

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$50.80 | \$68.49 | \$86.18 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|---------|
| 9th hour | \$66.30 |
| 10th hour | \$66.30 |
| Beyond 10 hours | \$66.30 |

Saturday

| | |
|-----------------|---------|
| First 8 hours | \$66.30 |
| 9th hour | \$66.30 |
| 10th hour | \$66.30 |
| Beyond 10 hours | \$66.30 |

| | |
|-----------------------|----------------|
| Sunday/Holiday | \$81.79 |
|-----------------------|----------------|

Four 10-hour days allowed? - No

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|---------------------------|---------------------------|-------------------|
| Sheet Metal Worker | Sheet Metal Worker | 05/10/2024 |

Classification Description: Journeyman -

A 4 10 schedule may be worked, 4 consecutive days Monday thru Friday.

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$74.96 | \$95.01 | \$115.06 |
| Apprentice: 1st & 2nd Periods | \$48.51 | \$59.65 | \$70.77 |
| Apprentice: 3rd & 4th Periods | \$50.74 | \$62.99 | \$75.23 |
| Apprentice: 5th & 6th Periods | \$52.96 | \$66.32 | \$79.67 |
| Apprentice: 7th & 8th Periods | \$55.19 | \$69.67 | \$84.13 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|----------|
| 9th hour | \$95.01 |
| 10th hour | \$95.01 |
| Beyond 10 hours | \$115.06 |

Saturday

| | |
|-----------------|----------|
| First 8 hours | \$95.01 |
| 9th hour | \$115.06 |
| 10th hour | \$115.06 |
| Beyond 10 hours | \$115.06 |

| | |
|-----------------------|-----------------|
| Sunday/Holiday | \$115.06 |
|-----------------------|-----------------|

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|------------------------------------|-------------------------|-------------------|
| Sprinkler Fitter Journeyman | Sprinkler Fitter | 05/10/2024 |

Classification Description: Sprinkler Fitter Journeyman -
 4 ten hour days allowed Monday-Friday
 Double time pay due after 12 hours worked M-F

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$78.57 | \$102.66 | \$126.74 |
| Apprentice: 10th Period | \$69.91 | \$87.12 | \$104.33 |
| Apprentice: 1st Period | \$31.91 | \$40.00 | \$48.09 |
| Apprentice: 2nd Period | \$51.25 | \$60.36 | \$69.47 |
| Apprentice: 3rd Period | \$53.58 | \$63.71 | \$73.83 |
| Apprentice: 4th Period | \$55.91 | \$67.04 | \$78.17 |
| Apprentice: 5th Period | \$58.25 | \$70.40 | \$82.55 |
| Apprentice: 6th Period | \$60.58 | \$73.73 | \$86.89 |
| Apprentice: 7th Period | \$62.91 | \$77.08 | \$91.24 |
| Apprentice: 8th Period | \$65.25 | \$80.44 | \$95.62 |
| Apprentice: 9th Period | \$67.58 | \$83.78 | \$99.98 |

Overtime Provisions

| Over 8-hour day/40-hour week | |
|-------------------------------------|----------|
| 9th hour | \$102.66 |
| 10th hour | \$102.66 |
| Beyond 10 hours | \$126.74 |
| Saturday | |
| First 8 hours | \$102.66 |
| 9th hour | \$126.74 |
| 10th hour | \$126.74 |
| Beyond 10 hours | \$126.74 |
| Sunday/Holiday | |
| | \$126.74 |

Four 10-hour days allowed? - No

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|--|----------------------------------|-------------------|
| Tile, Marble & Terrazzo Finisher-BAC2-Metro Detroit | Tile, Marble and Terrazzo | 11/14/2024 |

Classification Description: Work: Assisting mechanics (e.g., tile, marble, terrazzo workers) with tasks necessary for completing installations.

Materials: Supporting materials used for tile, marble, or terrazzo work, such as cement and adhesives.

| Wage Rates | Straight Time | Time and a Half | Double Time |
|---|---------------|-----------------|-------------|
| Total Hourly Wage | \$54.19 | \$68.23 | \$82.26 |
| Apprentice: TMT Finisher Apprentice Level 4 | \$40.89 | \$52.12 | \$63.35 |
| Apprentice: TMT Finisher Apprentice 1st Level | \$36.68 | \$45.81 | \$54.93 |
| Apprentice: TMT Finisher Apprentice 2nd Level | \$38.08 | \$47.91 | \$57.73 |
| Apprentice: TMT Finisher Apprentice 3rd Level | \$39.48 | \$50.01 | \$60.53 |
| Apprentice: TMT Finisher Apprentice Level 5 | \$42.29 | \$54.22 | \$66.15 |
| Apprentice: TMT Finisher Apprentice Level 6 | \$43.69 | \$56.32 | \$68.95 |
| Apprentice: TMT Setter Apprentice 7thLevel | \$35.64 | \$48.98 | \$62.31 |

Overtime Provisions

| Over 8-hour day/40-hour week | |
|------------------------------|---------|
| 9th hour | \$68.22 |
| 10th hour | \$68.22 |
| Beyond 10 hours | \$68.22 |
| Saturday | |
| First 8 hours | \$68.22 |
| 9th hour | \$68.22 |
| 10th hour | \$68.22 |
| Beyond 10 hours | \$68.22 |
| Sunday/Holiday | |
| | \$82.26 |

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|---|----------------------------------|-------------------|
| Tile, Marble & Terrazzo Mechanic - BAC 2 - Metro Detroit | Tile, Marble and Terrazzo | 11/14/2024 |

Classification Description: Work: Installing and finishing mosaic and terrazzo materials, including precision tasks like grinding and polishing. Adding aggregate to the top of the finished base and troweled or rolled into the finish.
 Materials: Marble, mosaic, Venetian enamel, terrazzo, granules of marble, granite, bluestone, enamel, mother of pearl, quartz, ceramic-colored quartz, rubber, neoprene, vinyl, magnesium chloride, and resinous or chemical substances.

| Wage Rates | Straight Time | Time and a Half | Double Time | Overtime Provisions |
|---|---------------|-----------------|-------------|-------------------------------------|
| Total Hourly Wage | \$60.99 | \$87.01 | \$113.01 | Over 8-hour day/40-hour week |
| Apprentice: TMT Setter Apprentice 1st Level | \$41.07 | \$51.50 | \$61.93 | 9th hour \$60.99 |
| Apprentice: TMT Setter Apprentice 2nd Level | \$42.81 | \$54.11 | \$65.41 | 10th hour \$60.99 |
| Apprentice: TMT Setter Apprentice 3rd Level | \$44.55 | \$56.72 | \$68.89 | Beyond 10 hours \$60.99 |
| Apprentice: TMT Setter Apprentice 4th Level | \$46.29 | \$59.33 | \$72.37 | Saturday |
| Apprentice: TMT Setter Apprentice 5th Level | \$48.03 | \$61.94 | \$75.85 | First 8 hours \$60.99 |
| Apprentice: TMT Setter Apprentice 6th Level | \$49.76 | \$64.55 | \$79.33 | 9th hour \$60.99 |
| Apprentice: TMT Setter Apprentice 7th Level | \$51.50 | \$67.15 | \$82.79 | 10th hour \$60.99 |
| Apprentice: TMT Setter Apprentice 8th Level | \$53.24 | \$69.76 | \$86.27 | Beyond 10 hours \$60.99 |
| | | | | Sunday/Holiday \$95.76 |

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|-------------------------|-------------------------|-------------------|
| Tower Technician | Tower Technician | 05/13/2024 |

Classification Description:

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$67.89 | \$98.24 | \$128.58 |

Overtime Provisions

| Over 8-hour day/40-hour week | |
|-------------------------------------|----------|
| 9th hour | \$98.24 |
| 10th hour | \$98.24 |
| Beyond 10 hours | \$98.24 |
| Saturday | |
| First 8 hours | \$98.24 |
| 9th hour | \$98.24 |
| 10th hour | \$98.24 |
| Beyond 10 hours | \$98.24 |
| Sunday/Holiday | |
| | \$128.58 |

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

ONLY due to inclement weather or customer requirements may Friday be used as a make up day if the normal scheduled work week was interrupted and time lost of five (5) hours or more was incurred by workmen covered under the terms of the 6-17-C/6-876-T agreement.

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|---------------------------|---------------------|-------------------|
| Truck Driver - RB1 | Truck Driver | 05/10/2024 |

Classification Description: on all trucks of 8 cubic yard capacity or less (except dump trucks of 8 cubic yard capacity or over, tandem axle trucks, transit mix and semis, euclid type equipment, double bottoms and low boys)

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$53.95 | \$70.30 | \$86.64 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|---------|
| 9th hour | \$69.32 |
| 10th hour | \$69.32 |
| Beyond 10 hours | \$69.32 |

Saturday

| | |
|-----------------|---------|
| First 8 hours | \$69.32 |
| 9th hour | \$69.32 |
| 10th hour | \$69.32 |
| Beyond 10 hours | \$69.32 |

| | |
|-----------------------|----------------|
| Sunday/Holiday | \$84.69 |
|-----------------------|----------------|

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|----------------------------|---------------------|-------------------|
| Truck Driver - RB1A | Truck Driver | 05/10/2024 |

Classification Description: of all trucks of 8 cubic yard capacity or over semi, tractor trailer

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$54.10 | \$70.52 | \$86.94 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|---------|
| 9th hour | \$69.55 |
| 10th hour | \$69.55 |
| Beyond 10 hours | \$69.55 |

Saturday

| | |
|-----------------|---------|
| First 8 hours | \$69.55 |
| 9th hour | \$69.55 |
| 10th hour | \$69.55 |
| Beyond 10 hours | \$69.55 |

| | |
|-----------------------|----------------|
| Sunday/Holiday | \$84.99 |
|-----------------------|----------------|

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|----------------------------|---------------------|-------------------|
| Truck Driver - RB1B | Truck Driver | 05/10/2024 |

Classification Description: on euclid type equipment, Pole drier, lowboy, doubles, fuel, bus, water

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$54.20 | \$69.70 | \$85.19 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|---------|
| 9th hour | \$69.70 |
| 10th hour | \$69.70 |
| Beyond 10 hours | \$69.70 |

Saturday

| | |
|-----------------|---------|
| First 8 hours | \$69.70 |
| 9th hour | \$69.70 |
| 10th hour | \$69.70 |
| Beyond 10 hours | \$69.70 |

| | |
|-----------------------|----------------|
| Sunday/Holiday | \$85.19 |
|-----------------------|----------------|

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|---------------------------|---------------------|-------------------|
| Truck Driver - RB2 | Truck Driver | 05/10/2024 |

Classification Description: of all trucks of 8 cubic yd capacity or over

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$44.10 | \$48.81 | \$49.80 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|---------|
| 9th hour | \$56.55 |
| 10th hour | \$56.55 |
| Beyond 10 hours | \$56.55 |

Saturday

| | |
|-----------------|---------|
| First 8 hours | \$56.55 |
| 9th hour | \$56.55 |
| 10th hour | \$56.55 |
| Beyond 10 hours | \$56.55 |

Sunday/Holiday

\$56.55

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|----------------------------|---------------------|-------------------|
| Truck Driver - RB2A | Truck Driver | 05/10/2024 |

Classification Description: of all trucks of 8 cubic yard capacity or less (except dump trucks of 8 cubic yard capacity or over, tandem axle trucks, transit mix and semis, euclid type equipment, double bottoms and low boys)

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$44.00 | \$48.66 | \$49.60 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|---------|
| 9th hour | \$56.40 |
| 10th hour | \$56.40 |
| Beyond 10 hours | \$56.40 |

Saturday

| | |
|-----------------|---------|
| First 8 hours | \$56.40 |
| 9th hour | \$56.40 |
| 10th hour | \$56.40 |
| Beyond 10 hours | \$56.40 |

| | |
|-----------------------|----------------|
| Sunday/Holiday | \$56.40 |
|-----------------------|----------------|

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Macomb

| Classification Name | Category | Last Updated |
|----------------------------|---------------------|-------------------|
| Truck Driver - RB2B | Truck Driver | 05/10/2024 |

Classification Description: on euclid type equipment

| Wage Rates | Straight Time | Time and a Half | Double Time |
|-------------------|---------------|-----------------|-------------|
| Total Hourly Wage | \$44.25 | \$49.04 | \$0.00 |

Overtime Provisions

Over 8-hour day/40-hour week

| | |
|-----------------|---------|
| 9th hour | \$56.78 |
| 10th hour | \$56.78 |
| Beyond 10 hours | \$56.78 |

Saturday

| | |
|-----------------|---------|
| First 8 hours | \$56.78 |
| 9th hour | \$56.78 |
| 10th hour | \$56.78 |
| Beyond 10 hours | \$56.78 |

| | |
|-----------------------|----------------|
| Sunday/Holiday | \$56.78 |
|-----------------------|----------------|

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

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SECTION 00851 - INDEX OF DRAWINGS

The following drawings, dated March 11, 2025, are issued for Warren Woods Public Schools, Warren Woods Tower High School-Titan Express Servery, Hawthorn Food Program, Freezer Replacement, Warren, Michigan. Architect's Project Number 242030.

TITLE SHEET

SHEET NO. TITLE

GENERAL

G1.00 COVER

Tower High School

ARCHITECTURAL

LS6.00 LIFE SAFETY PLAN

A6.01 COMPOSITE FLOOR PLANS
A6.02 ENLARGED PLANS, SECTIONS, AND DETAILS
A6.03 ROOM FINISH SCHEDULE AND INTERIOR ELEVATIONS

MECHANICAL

M0.00T MECHANICAL GENERAL INFORMATION
M1.00T MECHANICAL COMPOSITE PLANS
P4.00T ENLARGED PLUMBING DEMOLITION & NEW WORK
 UNDERGROUND PLANS
P4.01T ENLARGED PLUMBING DEMOLITION & NEW WORK FIRST
 FLOOR PLANS
M4.01T ENLARGED MECHANICAL DEMOLITION & NEW WORK FIRST
 FLOOR PLANS
M5.00T MECHANICAL DETAILS & SCHEDULES

ELECTRICAL

E0.00T ELECTRICAL GENERAL INFORMATION & LIGHTING
 SCHEDULE
E1.00T ELECTRICAL COMPOSITE PLAN
EP4.01T ENLARGED ELECTRICAL POWER DEMOLITION & NEW WORK
 FLOOR PLANS
EL4.01T ENLARGED ELECTRICAL LIGHTING DEMOLITION & NEW
 WORK FLOOR PLANS
E6.00T ELECTRICAL PANELS SCHEDULES & DETAILS
E7.00T ELECTRICAL ONE-LINE DIAGRAMS

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FOODSERVICE

FS-1 FOODSERVICE EQUIPMENT PLAN
FS-2 FOODSERVICE PLUMBING PLAN
FS-3 FOODSERVICE ELECTRICAL PLAN

Hawthorn

ARCHITECTURAL

LS7.00 LIFE SAFETY PLAN

A7.00 HAWTHORN COMPOSITE PLAN
A7.01 HAWTHORN FREEZER PLANS AND DETAILS

MECHANICAL

M0.00H MECHANICAL GENERAL INFORMATION
M1.00H MECHANICAL COMPOSITE PLAN
P4.01H ENLARGED PLUMBING DEMOLITION & NEW WORK FIRST
 FLOOR PLAN

ELECTRICAL

E0.00H ELECTRICAL GENERAL INFORMATION & LIGHTING
 SCHEDULE
E1.00H ELECTRICAL COMPOSITE PLAN
EP4.01H ENLARGED ELECTRICAL POWER DEMOLITION & NEW WORK
 FLOOR PLANS
E7.00H ELECTRICAL PANEL SCHEDULES & ONE-LINE RISER
 DIAGRAMS

FOODSERVICE

FS-4 HAWTHORN WALK-IN PLAN

END OF SECTION 00851

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SECTION 01010 - SUMMARY OF WORK

PART I - GENERAL

1.01 RELATED DOCUMENTS:

- A. Attention is directed to Division 0, Bidding and Contract Requirements, and to Division 1, General Requirements, which are hereby made a part of this section.

1.02 PROJECT:

- A. The project consists of, but is not limited to:

Tower High School Titan Express

Renovation of the existing Titan Express server including but not limited to reconfiguration of serving lines, masonry wall relocation and infill, removal of; overhead counter doors, man doors, ceilings, floors, finishes etc. with new porcelain ceramic finishes on walls, floors, new overhead counter door, new food service equipment, new plumbing, electrical, with relocation of existing vending machines.

Hawthorn Food Service Freezer/Cooler

Removal of a freezer/cooler system including removal of the insulated floor/concrete slabs and installation of a new freezer/cooler with new insulated floor slab (Note: additional insulation is required with some additional excavation)

NOTE: This project is subject to the State of Michigan Prevailing Wages and Bids should include this.

1.03 SCHEDULE:

- A. After award of contract the schedule will be finalized with the successful bidder and the Warren Woods Public Schools.
- B. Asbestos may be present and if found will be abated by the Owner. There will be no extra costs allowed due to the time required by the Owner for abatement.

PARTS 2 & 3 - PRODUCT AND EXECUTION

Not applicable

END OF SECTION 01010

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SECTION 01041 - PROJECT COORDINATION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

- A. Attention is directed to Division 0, Bidding and Contract Requirements, and to other Sections of Division 1, General Requirements, which are hereby made a part of this Section.

1.02 DESCRIPTION:

- A. Contractor shall provide the services of a full time Project Coordinator for the duration of the construction work.

- 1. Employ someone with not less than (5) five years experience performing coordination work on projects of similar size and scope.

- 2. Submit name and qualifications to Architect.

- B. Provide additional administrative and supervisory personnel as required for the performance of the work including coordination of the various subcontractors.

- C. Related Requirements Specified in Other Sections:

- 1. Summary of Work: Section 01010.

1.03 PROJECT COORDINATOR'S DUTIES:

- A. Coordinate the work of the various subcontractors:

- 1. For temporary utilities.

- 2. With the work of trades specified in Division 2 through 9.

- B. Coordinate the schedules of subcontractors.

- 1. Verify timely deliveries of products for installation by other trades.

- 2. Verify that labor and materials are adequate to maintain schedules.

- C. Maintain conferences among subcontractors and other concerned parties, as necessary to:

- 1. Maintain coordination and schedules.

- 2. Resolve matters in dispute.

D. Participate in project meetings:

1. Report progress of work.
2. Recommend needed changes in schedule.

E. Temporary Utilities:

1. Coordinate installation, operation and maintenance, to verify compliance with project requirements and with Contract Documents.
2. Verify adequacy of service at required locations.

F. Shop Drawings, Product Data and Samples:

1. Prior to submittal, review for compliance with Contract Documents.
 - a. Check field dimensions and clearance dimensions.
 - b. Check relation to available space.
 - c. Review the effect of any changes on the work of other contracts or trades.
 - d. Check compatibility with equipment and work of other trades.

G. Coordination Drawings:

1. Prepare, as required to assure coordination of work or to resolve conflicts.
2. Submit for review and transmittal.
3. Reproduce and distribute approved copies to all concerned parties.

H. Observe required testing; maintain a record of tests:

1. Testing agency and name of inspector.
2. Subcontractor.
3. Manufacturer's representative present.
4. Date and time of testing.

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5. Type of product or work.
 6. Type of test and results.
 7. Retesting required.
- I. Verify that subcontractors maintain accurate record documents.
- J. Substitutions and Changes:
1. Review proposals and requests.
 - a. Check for compliance with Contract Documents.
 - b. Verify compatibility with work and equipment of other trades.
 2. Promptly report deficiencies or discrepancies to contractor.
- K. Assemble documentation for handling of claims or disputes.
- L. Equipment Start-Up:
1. Check to assure that utilities and specified connections are complete and that equipment is in operable condition.
 2. Observe test, adjust and balance.
 3. Record results, including time and date of start-up.
- M. Inspection and Acceptance of Work:
1. Prior to inspection, check that work is complete and ready for acceptance
 2. Assist Inspector: Prepare list of items to be completed or corrected.
 3. Should acceptance of work constitute the beginning of the specified guarantee period, prepare and transmit written notice to Contractor for the Owner.
- N. Assemble record documents from subcontractors.

END OF SECTION 01041

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SECTION 01045 - CUTTING AND PATCHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements for cutting and patching.
- B. Refer to other Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.
 - 1. Requirements of this Section apply to mechanical and electrical installations. Refer to Mechanical & Electrical Drawings for other requirements and limitations applicable to cutting and patching mechanical and electrical installations.
- C. Demolition of selected portions of the building for alterations is included in Section 02070 "Selective Demolition."

1.3 SUBMITTALS

- A. Cutting and Patching Proposal: Where approval of procedures for cutting and patching is required before proceeding, submit a proposal describing procedures well in advance of the time cutting and patching will be performed and request approval to proceed. Include the following information, as applicable, in the proposal:
 - 1. Describe the extent of cutting and patching required and how it is to be performed; indicate why it cannot be avoided.
 - 2. Describe anticipated results in terms of changes to existing construction; include changes to structural elements and operating components as well as changes in the building's appearance and other significant visual elements.
 - 3. List products to be used and firms or entities that will perform Work.

4. Indicate dates when cutting and patching is to be performed.
5. List utilities that will be disturbed or affected, including those that will be relocated and those that will be temporarily out-of-service. Indicate how long service will be disrupted.
6. Where cutting and patching involves addition of reinforcement to structural elements, submit details and engineering calculations to show how reinforcement is integrated with the original structure.
7. Approval by the Architect to proceed with cutting and patching does not waive the Architect's right to later require complete removal and replacement of a part of the Work found to be unsatisfactory.

1.4QUALITY ASSURANCE

- A. Requirements for Structural Work: Do not cut and patch structural elements in a manner that would reduce their load-carrying capacity or load-deflection ratio.
- B. Operational and Safety Limitations: Do not cut and patch operating elements or safety related components in a manner that would result in reducing their capacity to perform as intended, or result in increased maintenance, or decreased operational life or safety.
- C. Visual Requirements: Do not cut and patch construction exposed on the exterior or in occupied spaces, in a manner that would, in the Architect's opinion, reduce the building's aesthetic qualities, or result in visual evidence of cutting and patching. Remove and replace Work cut and patched in a visually unsatisfactory manner.

PART 2 - PRODUCTS

2.1MATERIALS

- A. Use materials that are identical to existing materials. If identical materials are not available or cannot be used where exposed surfaces are involved, use materials that match existing adjacent surfaces to the fullest extent possible with regard to visual effect. Use materials whose installed performance will equal or surpass that of existing materials.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Before cutting existing surfaces, examine surfaces to be cut and patched and conditions under which cutting and patching is to be performed. Take corrective action before proceeding, if unsafe or unsatisfactory conditions are encountered.
 - 1. Before proceeding, meet at the site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.
 - a. Contractor shall trace underfloor electrical, conduit and plumbing lines prior to any floor cutting.

3.2 PREPARATION

- A. Temporary Support: Provide temporary support of Work to be cut.
- B. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of the Project that might be exposed during cutting and patching operations.
- C. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
- D. Take all precautions necessary to avoid cutting existing pipe, conduit or ductwork serving the building, but scheduled to be removed or relocated until provisions have been made to bypass them.

3.3 PERFORMANCE

- A. General: Employ skilled workmen to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time and complete without delay.
 - 1. Cut existing construction to provide for installation of other components or performance of other construction activities and the subsequent fitting and patching required to restore surfaces to their original condition.

- B. Cutting: Cut existing construction using methods least likely to damage elements to be retained or adjoining construction. Where possible review proposed procedures with the original installer; comply with the original installer's recommendations.
1. In general, where cutting is required use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut holes and slots neatly to size required with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 2. To avoid marring existing finished surfaces, cut or drill from the exposed or finished side into concealed surfaces.
 3. Cut through concrete and masonry using a cutting machine such as a carborundum saw or diamond core drill.
 4. Comply with requirements of applicable Sections of Division-2 where cutting and patching requires excavating and backfilling.
 5. By-pass utility services such as pipe or conduit, before cutting, where services are shown or required to be removed, relocated or abandoned. Cut-off pipe or conduit in walls or partitions to be removed. Cap, valve or plug and seal the remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after by-passing and cutting.
- C. Patching: Patch with durable seams that are as invisible as possible. Comply with specified tolerances.
1. Where feasible, inspect and test patched areas to demonstrate integrity of the installation.
 2. Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
 3. Patch, repair or rehang existing ceilings and/or soffits as necessary to provide an even plane surface of uniform appearance.
 - a. Where patching occurs in a smooth painted surface, extend final paint coat over entire unbroken containing the patch, after the patched area has received primer and second coat.

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3.4 CLEANING

- A. Thoroughly clean areas and spaces where cutting and patching is performed or used as access.

END OF SECTION 01045

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SECTION 01090 - REFERENCE STANDARDS

PART 1 - GENERAL

1.01 SECTION INCLUDES:

- A. Quality assurance.
- B. Schedule of references.

1.02 QUALITY ASSURANCE:

- A. For products or workmanship specified by association, trade, or Federal Standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- B. Conform to reference standard by date of issue current on date for receiving bids.
- C. Obtain copies of standards when required by Contract Documents.
- D. Maintain copy at job site during submittals, planning, and progress of the specific work, until Substantial Completion.
- E. Should specified reference standards conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.
- F. The contractual relationship of the parties to the Contract shall not be altered from the Contract Documents by mention or inference otherwise in any reference document.

1.04 SCHEDULE OF REFERENCE:

- AA Aluminum Association
900 19th Street, N.W. - Suite 300
Washington, DC 20006
- AABC Associated Air Balance Council
1518 K Street N.W.
Washington, DC 20005
- AASHTO American Association of State Highway
and Transportation Officials
444 North Capitol Street, N.W. - Suite 249
Washington, DC 20001

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ACI American Concrete Institute
P.O. Box 9094
Farmington Hills, MI 48333-9094

ADC Air Diffusion Council
1901 N. Roselle Rd., Suite 800
Schaumburg, IL 60195

AF&PA American Forest & Paper Association
1111 19th Street, NW, Suite 800
Washington, DC 20036

AGC Associated General Contractors of America
2300 Wilson Blvd., Suite 400
Arlington, VA 22201

AI Asphalt Institute
2696 Research Park Drive
Lexington, KY 40511-8480

AIA American Institute of Architects
1735 New York Avenue, N.W.
Washington, DC 20006-5292

AISC American Institute of Steel Construction
One East Wacker Drive
Suite 3100
Chicago, IL 60601-2001

AISI American Iron and Steel Institute
1140 Connecticut Ave - Suite 705
Washington, DC 20036

AITC American Institute of Timber Construction
7012 S. Revere Parkway - Suite 140
Englewood, CO 80112

AMCA Air Movement and Control Association
30 West University Drive
Arlington Heights, IL 60004

ANSI American National Standards Institute
25 West 43rd Street, Fourth Floor
New York, NY 10036

APA American Plywood Association
Box 11700
Tacoma, WA 98411-0700

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ARI Air Conditioning and Refrigeration Institute
4100 North Fairfax Drive - Suite 200
Arlington, VA 22203

ASHRAE American Society of Heating, Refrigeration and
Air Conditioning Engineers
1791 Tullie Circle, N.E.
Atlanta, GA 30329

ASME American Society of Mechanical Engineers
Three Park Avenue
New York, NY 10016-5990

ASTM American Society for Testing and Materials
100 Barr Harbor Drive
West Conshohocken, PA 19428-2959

AWI Architectural Woodwork Institute
46179 Westlake Drive, Suite 120
Potomac Falls, VA 20165

AWPA American Wood-Preservers' Association
P.O. Box 5690
Grandbury, TX 76049

AWS American Welding Society
550 N.W. LeJeune Road
Miami, FL 33126

AWWA American Water Works Association
6666 West Quincy Avenue
Denver, CO 80235

BIA Brick Institute of America
1350 Centennial Park Drive, Suite 301
Reston, VA 20191

CDA Copper Development Association
260 Madison Avenue - 16th Floor
New York, NY 10016

CLFMI Chain Link Fence Manufacturers Institute
10015 Old Columbia Road, Suite B-215
Columbia, MD 21046

CRSI Concrete Reinforcing Steel Institute
933 Plum Grove Road
Schaumburg, IL 60173-4758

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CSSB Cedar Shake and Shingle Bureau
P.O. Box 1178
Sumas, WA 98295-1178

DHI Door and Hardware Institute
14150 Newbrook Drive, Suite 200
Chantilly, VA 20151

EJCDC Engineers' Joint Contract Documents Committee
American Council of Engineering Companies
1015 15th Street, N.W., 8th Floor
Washington, DC 20005

EJMA Expansion Joint Manufacturers Association
25 North Broadway
Tarrytown, NY 10591

FGMA Flat Glass Marketing Association
3310 Harrison
White Lakes Professional Building
Topeka, KS 66611

FM Factory Mutual System
Standards Laboratories Department
1151 Boston-Providence Turnpike
Norwood, MA 02062

FS Federal Specification
General Services Administration
Specifications and Consumer Information
Distribution Section (WFSIS)
1800 F Street, NW
Washington, DC 20405

GA Gypsum Association
810 First Street N.W. #510
Washington, DC 20002-4268

ICC International Code Council
5203 Leesburg Pike, Suite 600
Falls Church, VA 22041

IEEE Institute of Electrical and Electronics Engineers
345 East 47th Street
New York, NY 10017

IMIAC International Masonry Industry All-Weather Council
International Masonry Institute
815 15th Street, N.W.
Washington, DC 20005

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MBMA Metal Building Manufacturer's Association
1300 Sumner Avenue
Cleveland, OH 44115-2351

MFMA Maple Flooring Manufacturers Association
60 Revere Drive
Northbrook, IL 60062

MIL Military Specification
Naval Publications and Forms Center
700 Robbins Avenue, Building 4, Section D
Philadelphia, PA 19111-5093

ML/SFA Metal Lath/Steel Framing Association
Division of National Association of Architectural Metal
Manufacturers (NAAMM MLIFSA)
600 South Federal Street, Suite 400
Chicago, IL 60605

NAAMM National Association of Architectural Metal
Manufacturers
800 Roosevelt Road, Building C, Suite 312
Glen Ellyn, IL 60137

NCMA National Concrete Masonry Association
2302 Horse Pen Road
Herndon, VA 22071-3499

NEBB National Environmental Balancing Bureau
8575 Grovement Circle
Gaithersburg, MD 20877

NEMA National Electrical Manufacturers' Association
1300 North 17th Street, Suite 1752
Rosslyn, VA 22209

NFPA National Fire Protection Association
#1 Battery March Park
Quincy, MA 02269-9101

NSWMA National Solid Wastes Management Association
4301 Connecticut Avenue, N.W., Suite 300
Washington, DC 20008-2304

NTMA National Terrazzo and Mosaic Association
201 North Maple, Suite 208
Purcellville, VA 20132

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PCA Portland Cement Association
5420 Old Orchard Road
Skokie, IL 60077

PCI Precast Prestressed Concrete Institute
175 W. Jackson Blvd.-Suite 1859
Chicago, IL 60604-9773

PS Product Standard
U.S. Department of Commerce
1401 Constitution Avenue, N.W.
Washington, DC 20230

RIS Redwood Inspection Service
Division of California Redwood Association
405 Enfrente Drive
Novato, CA 94949

SDI Steel Deck Institute
P.O. Box 25
Fox River Grove, IL 60021

SDI Steel Door Institute
c/o Wherry Associates
30200 Detroit Road
Cleveland, OH 44145-1967

SIGMA Sealed Insulating Glass Manufacturers Association
401 N. Michigan Avenue
Chicago, IL 60611

SJI Steel Joist Institute
3127 10th Avenue North
Myrtle Beach, SC 29577-6760

SMACNA Sheet Metal and Air Conditioning Contractors'
National Association
4201 Lafayette Center Drive
Chantilly, VA 20151-1209

SSPC Society for Protective Coatings
40 24th Street, 6th Floor
Pittsburgh, PA 15222-4656

TCNA Tile Council of North America, Inc.
100 Clemson Research Blvd.
Anderson, SC 29625

WARREN WOODS PUBLIC SCHOOLS
TOWER HS-TITAN EXPRESS SERVERY
HAWTHORN FOOD PROGRAM
FREEZER REPLACEMENT

242030

MARCH 11, 2025

TPI Turfgrass Producers International
2 East Main Street
East Dundee, IL 60118

UL Underwriters' Laboratories, Inc.
333 Pfingston Road
Northbrook, IL 60062-2096

WCLIB West Coast Lumber Inspection Bureau
6980 S.W. Varns Road
Tigard, OR 97223

WDMA Window & Door Manufacturers Associations
1400 W. Touhy Avenue, Suite 470
Des Plaines, IL 60018

WWPA Western Wood Products Association
522 SW Fifth Avenue, Suite 500
Portland, OR 97204-2122

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION 01090

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SECTION 01200 - PROJECT MEETINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and other Division-1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements for project meetings including but not limited to:
 - 1. Pre-Construction Conference.
 - 2. Pre-Installation Conferences.
 - 3. Coordination Meetings.
 - 4. Progress Meetings.
- B. Construction schedules are specified in Specification Section 01310 "Construction Schedules".

1.3 PRE-CONSTRUCTION CONFERENCE

- A. Schedule a pre-construction conference and organizational meeting at the Project site or other convenient location no later than (14) fourteen calendar days after execution of the Agreement and prior to commencement of construction activities. Conduct the meeting to review responsibilities and personnel assignments.
- B. Attendees: The Owner, Architect/Engineer and their consultants, the Contractor and its superintendent, major subcontractors, manufacturers, suppliers, independent testing agency and other concerned parties shall each be represented at the conference by persons familiar with and authorized to conclude matters relating to the work.
- C. Agenda: Discuss items of significance that could affect progress including such topics as:
 - 1. Tentative construction schedule.
 - 2. Critical work sequencing.
 - 3. Designation of responsible personnel.
 - 4. Procedures for processing field decisions and Change Orders.
 - 5. Procedures for processing Applications for Payment.

6. Distribution of Contract Documents.
7. Submittal of Shop Drawings, Product Data and Samples.
8. Preparation of record documents.
9. Use of the premises.
10. Office, Work and storage areas.
11. Equipment deliveries and priorities.
12. Safety procedures.
13. First aid.
14. Security.
15. Housekeeping.
16. Working hours.

1.4 PRE-INSTALLATION CONFERENCES

- A. 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 Architect and Owner of scheduled meeting dates.

1. 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.

2. 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 Architect.
3. 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.

1.5 COORDINATION MEETINGS

- A. 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.
- B. Request representation at each meeting by every party currently involved in coordination or planning for the construction activities involved.
- C. Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

1.6 PROGRESS MEETINGS

- A. Conduct progress meetings at the Project site. Notify the Owner and Architect/Engineer of scheduled meeting dates. Coordinate dates of meetings with preparation of the payment request.
- B. Attendees: In addition to representatives of the Owner and Architect/Engineer, each subcontractor, supplier, independent testing agency 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.
- C. Agenda: 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.

1. 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.
 2. Review the present and future needs of each entity present, including such items as:
 - a. Interface requirements.
 - b. Time.
 - c. Sequences.
 - d. Deliveries.
 - e. Off-site fabrication problems.
 - f. Access.
 - g. Site utilization.
 - h. Temporary facilities and services.
 - i. Hours of Work.
 - j. Hazards and risks.
 - k. Housekeeping.
 - l. Quality and Work standards.
 - m. Change Orders.
 - n. Documentation of information for payment requests.
- D. Reporting: No later than (3) three business days after each progress meeting date, distribute 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.
1. 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.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01200



SUBSTITUTION REQUEST (During the Bidding Phase)

Project: Substitution Request Number: From: To: Date: Re: A/E Project Number: Contract For:

Specification Title: Description: Section: Page: Article/Paragraph:

Proposed Substitution: Manufacturer: Address: Phone: Trade Name: Model No.:

Attached data includes product description, specifications, drawings, photographs, and performance and test data adequate for evaluation of the request; applicable portions of the data are clearly identified.

Attached data also includes a description of changes to the Contract Documents that the proposed substitution will require for its proper installation.

The Undersigned certifies:

- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product. Same warranty will be furnished for proposed substitution as for specified product. Same maintenance service and source of replacement parts, as applicable, is available. Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule. Proposed substitution does not affect dimensions and functional clearances. Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.

Submitted by: Signed by: Firm: Address: Telephone:

A/E's REVIEW AND ACTION

- Substitution approved - Make submittals in accordance with Specification Section 01340. Substitution approved as noted - Make submittals in accordance with Specification Section 01340. Substitution rejected - Use specified materials. Substitution Request received too late - Use specified materials.

Signed by: Date:

Supporting Data Attached: Drawings Product Data Samples Tests Reports

**SUBSTITUTION
REQUEST**
(After the Bidding/Negotiating Phase)

Project: _____ Substitution Request Number: _____

_____ From: _____

To: _____ Date: _____

_____ A/E Project Number: _____

Re: _____ Contract For: _____

Specification Title: _____ Description: _____

Section: _____ Page: _____ Article/Paragraph: _____

Proposed Substitution: _____

Manufacturer: _____ Phone: _____

Address: _____

Trade Name: _____ Model No.: _____

Installer: _____ Phone: _____

Address: _____

History: New Product 1-4 years old 5-10 years old More than 10 years old

Differences between proposed substitution and specified product: _____

Point-by-point comparative data attached.

Reason for not providing specified item: _____

Similar Installation:

Project: _____ Architect: _____

Address: _____ Owner: _____

_____ Date Installed: _____

Proposed Substitution affects other parts of work: No Yes; explain _____

Savings to Owner for accepting substitution: _____ (\$_____).

Proposed substitution changes Contract Time: No Yes [Add] [Deduct] _____ days.

Supporting Data Attached: Drawings Product Data Samples Tests

Reports _____

**SUBSTITUTION
REQUEST**
(After the Bidding/Negotiating Phase)

The Undersigned certifies:

- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
 - Same warranty will be furnished for proposed substitution as for specified product.
 - Same maintenance service and source of replacement parts, as applicable, is available.
 - Proposed substitution will have no adverse effects on other trades and will not affect or delay progress schedule.
 - Cost data as stated above is complete. Claims for additional costs related to accepted substitution which may subsequently become apparent are to be waived.
 - Proposed substitution does not affect dimensions and functional clearances.
 - Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.
 - Coordination, installation, and changes in the Work as necessary for accepted substitution will be complete in all respects.
-

Submitted by: _____

Signed by: _____

Firm: _____

Address: _____

Telephone: _____

Attachments: _____

A/E's Review Action

- Substitution approved – Make submittals in accordance with Specification Section 01340.
- Substitution approved as noted – Make submittals in accordance with Specification Section 01340.
- Substitution rejected – Use specified materials.
- Substitution Request received too late – Use specified materials.

Signed by: _____ Date: _____

Additional Comments: Contractor Subcontractor Supplier Manufacturer
 A/E Other

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SECTION 01310 - CONSTRUCTION SCHEDULES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

- A. Attention is directed to Division 0, Bidding and Contract Requirements, and to other Sections of Division 1, General Requirements, which are hereby made a part of this Section.

1.02 DESCRIPTION OF REQUIREMENTS:

- A. General: This section specifies the particular administrative and procedural requirements for progress time scheduling and progress reporting for the performance of the work, as indicated in the General Conditions and elsewhere in the Contract Documents. Refer also to the General Conditions and to the "Contractor" for definition and specific dates of the Contract Time.
- B. Scheduling Responsibility: Submission of Contractor's progress schedule to the Owner, Architect/Engineer, or independent testing agency shall not relieve the Contractor of his total responsibility for the requirements of the Contract Documents, including adverse effects such as delays resulting from ill-timed work; refer to General Conditions.

1.03 FORM OF SCHEDULES:

- A. Contractor shall prepare a "Plan of Operations and Progress Schedule" which shall show concisely the manner in which different phases of the work are to be started, methods and speed for the inter-relationship of the work under the various contracts, times upon which different phases of the work are to be started, methods and speed for progressing the different phases and dates upon which the certain subcontractors are dependent upon that under other subcontracts.
- B. The plan of operations and progress schedule shall be "weighed" to schedule each trade in proportion to the entire project, both physically and financially.
- C. In preparing the above plan of operations and progress schedule, the Contractor shall assure that the methods, dates and other pertinent matters are acceptable to the Architect/Engineer and, when completed, he shall submit to and obtain approval from the Architect/Engineer and Owner.

- D. After approval of the above plan of operations and progress schedule, the Contractor shall be responsible for seeing that it is adhered to and for ascertaining that proper coordination is maintained between work of all Contracts.

1.04 PROGRESS REVISIONS:

- A. Indicate progress of each activity to date of submission.
- B. Show changes occurring since previous submission of schedule:
 - 1. Major changes in scope.
 - 2. Activities modified since previous submission.
 - 3. Revised projections of progress and completion.
 - 4. Other identifiable changes.
- C. Provide a narrative report as needed to define:
 - 1. Problem areas, anticipated delays, and the impact on the schedule.
 - 2. Corrective action recommended and its effect.
 - 3. The effect of changes on schedules of other contractors.

1.05 SUBMISSIONS:

- A. Submit initial schedules within (14) fourteen calendar days after award of Contract.
 - 1. Architect/Engineer and Owner will review schedules and return review copy within (10) ten business days after receipt.
 - 2. Resubmit within (10) ten calendar days after return of review copy.
- B. Submit a revised and updated progress schedule and narratives with each application for payment, but not less than once a month until project is complete.

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1.06 DISTRIBUTION:

- A. Distribute copies of the reviewed schedules and narratives to:
 - 1. Job site file.
 - 2. Subcontractors.
 - 3. Other concerned parties.
- B. Instruct recipients to report promptly to the Contractor, in writing, any problems anticipated by the projections shown in the schedules.

1.07 DAILY REPORTS:

- A. Contractor shall prepare a daily report, recording the following information concerning events at the site and submit duplicate copies to the Architect and Owner at regular intervals not exceeding weekly intervals.
 - 1. List of subcontractors at the site.
 - 2. List of separate contractors at the site.
 - 3. Count of personnel at the site.
 - 4. High/low temperatures, general weather conditions.
 - 5. Accidents (refer to accident reports).
 - 6. Meetings and significant decisions.
 - 7. Unusual events.
 - 8. Stoppages, delays, shortages, losses.
 - 9. Emergency procedures, field orders.
 - 10. Orders/requests by governing authorities.
 - 11. Change orders received, implemented.

PART 2 and 3 - PRODUCTS AND EXECUTION - Not Applicable

END OF SECTION 01310

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SECTION 01340 - SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

- A. Attention is directed to Division 0, Bidding and Contract Requirements, and to other Sections of Division 1, General Requirements, which are hereby made a part of this Section.

1.02 DESCRIPTION:

- A. Submit shop drawings, product data and samples as required by the Contract Documents. Individual submittal requirements are specified in applicable sections for each unit of work. Receive, check and coordinate all submittals of contractors as provided herein.

B. Definitions:

1. Shop Drawings are drawings, diagrams, schedules and other data specifically prepared for the Work by the Contractor or any subcontractor, manufacturer, supplier or distributor to illustrate some portion of the Work.
2. Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams and other information furnished by the Contractor to illustrate a material, product or system for some portion of the Work.
3. Samples are physical examples which illustrate materials, equipment or workmanship and establish standards by which the work will be judged.

1.03 SUBMITTAL REQUIREMENTS:

- A. Coordinate preparation and processing of submittals with performance of the work so that work will not be delayed by submittals. Coordinate and sequence different categories of submittals for the same work, and for interfacing units of work, so that one will not be delayed for coordination with another. No extension of time will be allowed because of failure to properly coordinate and sequence submittals.
- B. Submit a pdf version of each shop drawing, including fabrication, erection, layout and setting drawings and such other drawings as required under various sections of the

Specifications, until final acceptance is obtained. Prepare drawings legible, drawing plans, elevations, sections and details in scales required and printable at 100% scale on sheets. Sheets not larger than 30" x 42" nor smaller than 8-1/2" x 11". Photo reproductions of contract documents are not an acceptable submittal. Submit copies of manufacturer's descriptive data including catalog sheets for materials, equipment and fixtures, showing dimensions, performance characteristics and capacities, wiring diagrams and controls, schedules, and other pertinent information as required. Where materials describe more than one product or model, clearly identify which is to be furnished.

- C. Shop drawings, product data and samples shall be dated including Contractor and Subcontractor dates of submittal and approval, and marked to show the names of the Project, Architect/Engineer, Contractor, origination Subcontractor, manufacturer or supplier, and separate detailer if pertinent. Shop drawings shall completely identify Specification section and locations at which materials or equipment are to be installed. Reproductions of Contract Drawings are acceptable as Shop Drawings only when specifically authorized in writing by the Architect/Engineer.
- D. Submission of shop drawings, product data and samples shall be accompanied by a copy of a transmittal letter containing Project name, Contractor's name, number of drawings, and samples, titles and other pertinent data. Transmittal shall bear signature of the Contractor as evidence he checked same and found them in conformance with the Contract Documents.
- E. The Contractor shall review, approve and submit, with reasonable promptness and in such sequence as to cause no delay in the Work or in the work of the Owner or any separate contractor, all Shop Drawings, Product Data and Samples required by the Contract Documents.
- F. By approving and submitting Shop Drawings, Product Data and Samples, the Contractor represents that he has determined and verified all materials, field measurements, and field construction criteria related thereto, or will do so, and that he has checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.
- G. The Contractor shall not be relieved of responsibility for the deviation from the requirements of the Contract Documents by the Architect/Engineer's acceptance of Shop Drawings,

Product Data or Samples under Paragraph 13.12 of the 2017 edition of the AIA A201 General Conditions, unless the Contractor has specifically informed the Architect/Engineer in writing of such deviation at the time of sub-deviation. The Contractor shall not be relieved from responsibility for errors or omissions in the Shop Drawings, Product Data or Samples by the Architect/Engineer's acceptance thereof.

- H. The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data or Samples, to revisions other than those requested by the Architect/Engineer on previous submittals.
- I. No portion of the Work requiring submission of a Shop Drawing, Product Data or Sample shall be commenced until the submittal has been accepted by the Architect/Engineer as provided in Paragraph 13.12 of the 2017 edition of the AIA A201 General Conditions. All such portions of the Work shall be in accordance with approved submittals.
- J. Architect/Engineer will review Shop Drawings, Product Data and Samples as provided in Paragraph 13.12 of the 2017 edition of the AIA A201 General Conditions. He will mark each such submittal as follows:
 - 1. Accepted - Where no comment made.
 - 2. Accepted as Noted - Where comments indicated on submittal qualifying, modifying, or otherwise changing it; however, submittal can be used for ordering, fabrication and erection at contractor's own risk until revised submittals have been made, reviewed and stamped approved.
 - 3. Revise & resubmit - Where comments indicated on submittal require revisions and resubmission prior to ordering and/or fabrication and erection.
 - 4. Rejected - Where proposed submittals do not conform to the contract documents.
- K. Contractor is responsible for obtaining and distributing required prints of shop drawings to his subcontractors and material suppliers; after as well as before final approval. Prints of reviewed shop drawings shall be made from transparencies which carry the Architect/Engineer's appropriate stamp.

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- L. Obtain copies of all shop drawings, product data and samples submitted to date and accepted from other contractors.

PARTS 2 and 3 - PRODUCT AND EXECUTION

Not applicable.

END OF SECTION 01340

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SECTION 01370 - SCHEDULE OF VALUES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

- A. Requirements, and to other Sections of Division 1, General Requirements, which are hereby made a part of this Section.

1.02 DESCRIPTION OF WORK:

- A. Upon request submit to the Architect a preliminary schedule of values within (3) three business days of submission of bids for review prior to Contractor interviews. The schedule of values provided under 1.02A will not be considered final for purposes of the contract or for purposes of payment.
- B. Submit to the Architect a Schedule of Values allocated to the various portions of the work, within (10) ten business days after award of contract.
- C. Upon request of the Architect, support the values with data which will substantiate their correctness.
- D. The Schedule of Values, unless objected to by the Architect or Owner, shall be used only as the basis for the Contractor's Applications for Payment.

1.03 FORM AND CONTENT OF SCHEDULE OF VALUES:

- A. Use AIA Forms G702 and G702A or forms provided by Owner.
- B. Schedule shall list the installed value of the component parts of the work in sufficient detail to serve as a basis for computing values for progress payments during construction.
- C. Follow the table of contents of Sections as the format for listing component items.
 - 1. Identify each line item with the number and title of the respective major section of the specifications.
- D. For each major line item list sub-values of major products or operations under the item.
 - 1. Each item shall include a directly proportional amount of the Contractor's overhead and profit.

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E. The sum of all values listed in the schedules shall equal
the total Contract Sum.

PARTS 2 AND 3 - PRODUCTS AND EXECUTION - Not Applicable

END OF SECTION 01370

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SECTION 01400 - QUALITY CONTROL

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

- A. Attention is directed to Division 0, Bidding and Contract Requirements, and to Division 1, General Requirements, which are hereby made a part of this Section.

1.02 DESCRIPTION:

- A. Specific quality control requirements for the work are indicated throughout the contract documents. The term "Quality Control" includes, but is not necessarily limited to, inspection and testing and associated requirements. This section does not specify or modify Architect's duties relating to quality control and Contract enforcement.
- B. Coordinate quality control programs of separate contractors including submittals, conferences and on site programs.

1.03 RESPONSIBILITY:

- A. Residual Contractor Responsibility: Whatever required, inspection, testing and similar quality control provisions to be performed by independent agencies (not directly by the Contractor), and not indicated to be Owner's responsibility, shall be the Contractor's responsibility. The costs for those required services by independent testing laboratories are recognized to be included in Contract Sum.
- B. Contractor's General Responsibility: No failure of test agencies, whether engaged by Owner or Contractor, to perform adequate inspections or tests or to properly analyze or report results, shall relieve Contractor of responsibility for fulfillment of requirements of contract documents. It is recognized that required inspection and testing program is intended to assist the Contractor, Owner, Architect, and governing authorities in nominal determination of probable compliances with requirements for certain elements of work. The program is not intended to limit the Contractor's regular quality control program, as needed for general assurance of compliances.

1.04 QUALITY ASSURANCE:

- A. General Workmanship Standards: Comply with recognized workmanship quality standards within the industry as applicable to each unit of work, including ANSI standards where applicable. It is a requirement that each category of trades person or installer performing the work be prequalified, to the extent of being familiar with applicable and recognized quality standards for that category of work, and being capable of workmanship complying with those standards.
- B. Qualification of Quality Control Agencies: Except where another qualification standard is indicated, and except where it is specifically indicated that use of prime product manufacturer's test facilities is acceptable, engage independent testing laboratories complying with "Recommended Requirements for Independent Laboratory Qualifications" as published by American Council of Independent Laboratories, and specializing in type(s) of inspections and tests required.

1.05 SUBMITTALS:

- A. General: Refer to Section 01340, "Shop Drawings, Product Data and Samples" for requirements applicable to inspection and test reports, quality control samples, maintenance agreements, warranties, and similar documentation of quality compliances as required. Refer to individual work sections of Division 2 through 28 for specific certification and submittal requirements.
- B. Copies and Distribution: Where inspection and test reports and certifications are required by governing authorities, provide additional copies as required, and where required, send copies directly from inspection or testing agency to governing authority.

1.06 PRODUCT DELIVERY, STORAGE, AND HANDLING:

- A. General: Handle, store and protect materials and products, including fabricated components, by methods and means which will prevent damage, deterioration and losses including theft (and resulting delays), thereby ensuring highest quality results as performance of the work progresses. Control delivery schedules so as to minimize unnecessary long-term storage at project site prior to installation.

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PART 2 - PRODUCTS

Not applicable.

PART 3 - EXECUTION:

3.01 PREPARATION FOR INSTALLATION:

- A. Pre-Installation Conferences: Well in advance of installation of every major unit of work which requires coordination with other work, meet at the project site with installers and representatives of manufacturers and fabricators who are involved in or affected by the unit of work, and in its coordination or integration with other work which has proceeded or will follow. Advise Architect and Owner of scheduled meeting dates. At each meeting, review progress of other work and preparations for particular work under consideration, including requirements of contract documents, options, related change orders, purchases, deliveries, shop drawings, product data, quality control samples, possible conflicts, compatibility problems, time schedule, weather limitations, temporary facilities, space and access limitations, structural limitations, governing regulations, safety, inspection and testing requirements required performance results, recording requirements, and protection. Record significant discussions of each conference, and agreements and disagreements along with final plan of action. Distribute record of meeting promptly to everyone concerned, including Architect and Owner.
1. Do not proceed with the work if associated pre-installation conference cannot be concluded successfully. Instigate actions to resolve impediments to performance of the work, and reconvene conference at earliest date feasible.
- B. Installer's Inspection of Conditions: Require Installer of each major unit of work to inspect substrate to receive the work, and conditions under which the work will be performed, and to report (in writing to the Contractor) unsatisfactory conditions. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the Installer.

3.02 COORDINATION OF TEST AGENCY WORK:

- A. Coordination with Owner's Agencies: Afford access and reasonable time in construction sequence for Owner's inspection and tests to be performed. Cooperate with agencies and provide incidental labor and services needed for the removal and delivery of test samples, and for inspections and taking measurements. Provide patching and restoration services where test samples have been removed, complying with individual technical sections of Divisions 2 through 28.
1. Except for specialized laboratory sampling equipment, and except as otherwise indicated, supply and operate tools and construction equipment needed to obtain test samples from the work, including cutting devices for sawing, drilling, flame-cutting, coring and similar operations. Assist agencies in labeling and packing of test samples removed from the work.
- B. Coordination with Contractor's Independent Agencies: Except for required independent agency activities of inspection, measuring, testing, analyzing, reporting and similar activities, the assignment of labor, equipment, cutting, Patching and similar necessary activities associated therewith are Contractor's option recognizing that entire activity is Contractor's responsibility.
- C. Test Agency Responsibilities:
1. Test agencies, regardless of whether engaged by Owner or Contractor, are not authorized to change or negate requirements of Contract Documents. Each agency shall coordinate its assigned work with construction schedule as maintained by Contractor, and shall perform its work promptly so as not to delay the work. Observances (by agencies) having a bearing on the work shall be reported to Architect in most expeditious way possible, and shall be recorded in writing by agency. Agency personnel shall not interfere with or assume duties of Contractor.
 2. Reports: The testing agency shall prepare reports of inspections and laboratory tests, including analysis and interpretation of test results where applicable. Properly identify each report and, where required, provide agency's certification of test results. Describe test methods used, and compliance with recognized test standards (if any). Complete and submit report at earliest possible date in each case.

3.03 INSTALLATION QUALITY CONTROL:

- A. Manufacturer's Instructions: Where installations include manufactured products, comply with manufacturer's applicable instructions and recommendations for installation, to whatever extent these are more explicit or more stringent than applicable requirements indicate in contract documents.
- B. Inspect each item of materials or equipment, immediately prior to installation, and reject damaged and defective items.
- C. Provide attachment and connection devices and methods for securing work properly as it is installed; true to line and level, and within recognized industry tolerances, if not otherwise indicated. Allow for expansions and building movements. Provide uniform joint widths in exposed work, organized for best possible visual effect. Refer questionable visual effect choices to Architect for final decision.
- D. Recheck measurements and dimensions of the work, as an integral step of starting each installation.
- E. Install work during conditions of temperature, humidity, exposed, forecasted weather, and status of project completion which will ensure best possible results for each unit of work, in coordination with entire work. Isolate each unit of work from non-compatible work, as required to prevent deterioration.
- F. Coordinate enclosure (closing-in) of work with required inspections and tests, so as to avoid necessity of uncovering work for that purpose.
- G. Mounting Heights: Except as otherwise indicated, mount individual units of work at industry-recognized standard mounting heights, for applications indicated. Refer questionable mounting height choices to Architect for final decision.
- H. Adjust, clean, lubricate, restore, marred finished, and protect newly installed work, to ensure that it will remain without damage or deterioration during the remainder of construction period.

END OF SECTION 01400

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SECTION 01500 - TEMPORARY FACILITIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section specifies requirements for temporary services and facilities, including utilities, construction and support facilities, security and protection.
- B. Temporary utilities required include but are not limited to:
 - 1. Not applicable.
- C. Temporary construction and support facilities required include but are not limited to:
 - 1. Waste disposal services.
 - 2. Construction aids and miscellaneous services and facilities.
- D. Security and protection facilities required include but are not limited to:
 - 1. Temporary fire protection.
 - 2. Barricades, warning signs, lights.
 - 3. Environmental protection.

1.3 SUBMITTALS

- A. Not applicable.

1.4 QUALITY ASSURANCE

- A. Regulations: Comply with industry standards and applicable laws and regulations if authorities having jurisdiction, including but not limited to:
 - 1. Building Code requirements.
 - 2. Health and safety regulations.
 - 3. Utility company regulations.
 - 4. Police, Fire Department and Rescue Squad rules.
 - 5. Environmental protection regulations.

- B. Standards: Comply with NFPA Code 241, "Building Construction and Demolition Operations", ANSI-A10 Series standards for "Safety Requirements for Construction and Demolition", and NECA Electrical Design Library "Temporary Electrical Facilities."
1. Refer to "Guidelines for Bid Conditions for Temporary Job Utilities and Services", prepared jointly by AGC and ASC, for industry recommendations.
 2. Electrical Service: Comply with NEMA, NECA and UL standards and regulations for temporary electric service. Install service in compliance with National Electric Code (NFPA 70).
- C. Inspections: Arrange for authorities having jurisdiction to inspect and test each temporary utility before use. Obtain required certifications and permits.

1.5 PROJECT CONDITIONS

- A. 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.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. 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.
- B. Water: Provide potable water approved by local health authorities.

2.2 EQUIPMENT

- A. 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.

- B. 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.
- C. Electrical Outlets: Provide properly configured NEMA 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.
- D. 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.
- E. First Aid Supplies: Comply with governing regulations.
- F. 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.
 - 1. Comply with NFPA 10 and 241 for classification, extinguishing agent and size required by location and class of fire exposure.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. 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. Relocate and modify facilities as required.
- B. 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.

3.2 TEMPORARY UTILITY INSTALLATION

- A. General: Engage the appropriate local utility company to install temporary service or connect to existing service. Where the company provides only part of the service, provide the remainder with matching, compatible materials and equipment; comply with the company's recommendations.
1. Arrange with the company and existing users for a time when service can be interrupted, where necessary, to make connections for temporary services.
 2. Provide adequate capacity at each stage of construction. Prior to temporary utility availability, provide trucked-in services.
 3. Use Charges: Cost or use charges for temporary facilities are not chargeable to the Owner or Architect, and will not be accepted as a basis of claims for a Change Order.

3.3 TEMPORARY CONSTRUCTION AND SUPPORT FACILITIES INSTALLATION

- A. Locate temporary construction and support facilities for easy access.
1. 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.
- B. Toilets: The Contractor may use the Owner's existing designated toilet facilities near the Cafeteria at Tower HS and the toilets designated by the Owner at Hawthorn. Contractor is responsible for cleaning of toilet rooms at date of substantial completion.
- C. Drinking Water Fixtures: Contractor may use drinking fountains in the Cafeteria.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Except for use of permanent fire protection as soon as available, do not change over from use of temporary security and protection facilities to permanent facilities until Substantial Completion, or longer as requested by the Architect.

- B. Temporary Fire Protection: Until fire protection needs are supplied by permanent facilities, 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."
1. 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.
 2. Store combustible materials in containers in fire-safe locations.
 3. 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.
 4. Provide supervision of welding operations, combustion type temporary heating units, and similar sources of fire ignition.
- C. Permanent Fire Protection: At the earliest feasible date in each area of the Project, complete installation of the permanent fire protection facility, including connected services, and place into operation and use. Instruct key personnel on use of facilities.
- D. Barricades, Warning Signs and Lights: Comply with standards and code requirements for erection of structurally adequate barricades. Paint with appropriate colors, graphics and warning signs to inform personnel and the public of the hazard being protected against. Where appropriate and needed provide lighting, including flashing red or amber lights.
- E. Security Enclosure and Lockup: Install substantial temporary enclosure of partially completed areas of construction. Provide locking entrances to prevent unauthorized entrance, vandalism, theft and similar violations of security.
1. Storage: Where materials and equipment must be stored, and are of value or attractive for theft, provide a secure lockup. Enforce discipline in connection with the installation and release of material to minimize the opportunity for theft and vandalism.

- F. 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.

3.5 OPERATION, TERMINATION AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. Limit availability of temporary facilities to essential and intended uses to minimize waste and abuse.
- B. Maintenance: Maintain facilities in good operating condition until removal. Protect from damage from weather and similar elements.
- C. 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.
1. Materials and facilities that constitute temporary facilities are property of the Contractor.
 2. At Substantial Completion, clean and renovate permanent facilities that have been used during the construction period, including but not limited to:
 - a. Replace air filters and clean inside of ductwork and housings in areas affected by construction.

END OF SECTION 01500

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SECTION 01600 - MATERIAL AND EQUIPMENT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

- A. Attention is directed to Division 0, Bidding and Contract Requirements, and to Division 1, General Requirements, which are hereby made a part of this Section.

1.02 DESCRIPTION:

- A. Material and equipment incorporated into the work:

1. Conform to applicable specifications and standards.
2. Comply with size, make, type and quality specified, or as specifically approved in writing by the architect.
3. Manufactured and Fabricated Products:
 - a. Design, fabricate and assemble in accord with the best engineering and shop practices.
 - b. Manufacture like parts of duplicate units to standard sizes and gages, to be interchangeable.
 - c. (2) Two or more items of the same kind shall be identical, by the same manufacturer.
 - d. Products shall be suitable for service conditions.
 - e. Equipment capacities, sizes and dimensions shown or specified shall be adhered to unless variations are specifically approved in writing.
4. Do not use material or equipment for any purpose other than that for which it is designed or is specified.

1.03 MANUFACTURER'S INSTRUCTIONS:

- A. When Contract Documents require that installation of work shall comply with manufacturer's printed instructions, obtain and distribute copies of such, including three copies to Architect.
 1. Maintain (1) one set of complete instructions at the job site during installation and until completion.

- B. Handle, install, connect, clean, condition and adjust products in strict accord with such instructions and in conformity with specified requirements.
 - 1. Should job conditions or specified requirements conflict with manufacturer's instructions, consult with Architect for further instructions.
 - 2. Do not proceed with work without clear instructions.
- C. Perform work in accord with manufacturer's instructions. Do not omit preparatory step or installation procedure unless specifically modified or exempted by contract documents.

1.04 TRANSPORTATION AND HANDLING:

- A. Arrange deliveries of products in accord with construction schedules, coordinate to avoid conflict with work and conditions at the site.
 - 1. Immediately on delivery, inspect shipments to assure compliance with requirements of contract documents and approved submittals, and that products are properly protected and undamaged.
- B. Provide equipment and personnel to handle products by methods to prevent soiling or damage to products or packaging.

1.05 STORAGE AND PROTECTION:

- A. Store products in accord with manufacturer's instructions, with seals and labels intact and legible.
 - 1. Store products subject to damage by the elements in weather tight enclosures.
 - 2. Maintain temperature and humidity within the ranges required by manufacturer's instructions.
- B. Arrange storage in a manner to provide easy access for inspection. Make periodic inspections of stored products to assure that products are maintained under specified conditions, and free from damage or deterioration.

C. Preparation After Installation:

1. Provide substantial coverings as necessary to protect installed products from damage from traffic and subsequent construction operations. Remove when no longer needed.

1.06 SUBSTITUTIONS AND PRODUCT OPTIONS:

A. Products List:

1. Within (14) fourteen calendar days after contract date, submit to Architect a complete list of major products proposed to be used, with the name of the manufacturer and the installing subcontractor. Comply with provisions for Contractor's Options and Substitutions.
 - a. Submit Substitution Request Form 1252 to Architect for review and comment.

B. Contractor's Options:

1. For products specified only by reference standard, select any product meeting that standard.
2. For products specified by naming several products or manufacturers, select any one of the products or manufacturers named, which complies with the specifications.
3. For products specified by naming one or more products or manufacturers and "or equal," Contractor must submit a request as for substitutions for any product or manufacturer not specifically named.
4. For products specified by naming only one product and manufacturer, there is no option.

C. Substitutions:

1. For a period of (14) fourteen calendar days after contract date, Architect will consider written requests from Contractor for substitution of products.
 - a. Submit Substitution Request Form 1252 to Architect for review and comment.

2. Submit a separate request for each product, supported with complete data, with drawings and samples as appropriate, including:
 - a. Comparison of the qualities of the proposed substitution with that specified.
 - b. Changes required in other elements of the work because of the substitution.
 - c. Effect on the construction schedule.
 - d. Cost data comparing the proposed substitution with the product specified.
 - e. Any required license fees or royalties.
 - f. Availability of maintenance service, and source of replacement materials.
3. Architect shall be the judge of the acceptability of the proposed substitution except where a change in cost is involved.

D. Contractor's Representation:

1. A request for a substitution constitutes a representation that Contractor:
 - a. Has investigated the proposed product and determined that it is equal to or superior in all respects to that specified.
 - b. Will provide the same warranties or bonds for the substitution as for the product specified.
 - c. Will coordinate the installation of an accepted substitution into the work, and meet such other changes as may be required to make the work complete in all respects.
 - d. Waives all claims for additional costs, under his responsibility which may subsequently become apparent.

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E. Architect will review requests for substitutions with reasonable promptness, and notify Contractor, in writing, of the decision to accept or reject the requested substitution.

PARTS 2 AND 3 PRODUCTS AND EXECUTION

Not applicable.

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SECTION 01700 - PROJECT CLOSEOUT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements for project closeout, including but not limited to:
 - 1. Inspection procedures.
 - 2. Project record document submittal.
 - 3. Operating and maintenance manual submittal.
 - 4. Submittal of warranties.
 - 5. Final cleaning.
- B. Closeout requirements for specific construction activities are included in the appropriate Sections in Divisions 2 through 11 and also the Mechanical and Electrical Specifications.

1.3 SUBSTANTIAL COMPLETION

- A. Preliminary Procedures: Before requesting inspection for certification of Substantial Completion, complete the following. List exceptions in the request.
 - 1. 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.
 - a. 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.
 - 2. Advise Owner of pending insurance change-over requirements.

3. Submit specific warranties, workmanship bonds, maintenance agreements, final certifications and similar documents.
4. 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.
5. Complete final clean up requirements, including touch-up painting. Touch-up and otherwise repair and restore marred exposed finishes.

B. Inspection Procedures: On receipt of a request for inspection, the Architect will either proceed with inspection or advise the Contractor of unfilled requirements. The Architect 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.

1. The Architect/Engineer will repeat inspection when requested and assured that the Work has been substantially completed. NOTE: Contractor will be responsible to the Owner for additional fees to pay for Architects services if multiple inspections are required to review incomplete punch list items and/or close punch list items out.
2. Results of the completed inspection will form the basis of requirements for final acceptance.

1.4 FINAL ACCEPTANCE

A. Preliminary Procedures: Before requesting final inspection for certification of final acceptance and final payment, complete the following. List exceptions in the request.

1. 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.
2. Submit an updated final statement, accounting for final additional changes to the Contract Sum.
3. Submit a certified copy of the Architect'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 Architect.
4. Submit consent of surety to final payment.
5. Submit evidence of final, continuing insurance coverage complying with insurance requirements.

- B. Reinspection Procedure: The Architect will reinspect 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 Architect.
1. Upon completion of reinspection, the Architect 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.
 2. If necessary, reinspection will be repeated. NOTE: Contractor will be responsible to the Owner for additional fees to pay for Architects services if multiple inspections are required to review incomplete punch list items and/or close punch list items out.

1.5 RECORD DOCUMENT SUBMITTALS

- A. General: Do not use record documents for construction purposes; protect from deterioration and loss in a secure, fire-resistive location; provide access to record documents for the Architect/Engineer's reference during normal working hours.
- B. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction as follows:
1. Include Contract modifications such as Addenda, supplementary instructions, change directives, field orders, minor changes in the work, and change orders.
 2. Include locations of concealed elements of the work.
 3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the work.
 4. Field changes of dimension and detail.
 5. Details not on original drawings.
- C. Record Specifications: Maintain (1) one complete copy of the Project Manual, including addenda, and one (1) 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.

1. Upon completion of the Work, submit record Specifications to the Architect/Engineer for the Owner's records.
- D. Record Product Data: Maintain (1) 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.
1. Upon completion of mark-up, submit complete set of record Product Data to the Architect/Engineer for the Owner's records.
- E. Record Sample Submitted: Immediately prior to the date or dates of Substantial Completion, the Contractor will meet at the site with the Architect 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.
- F. 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 Architect/Engineer for the Owner's records.
- G. Maintenance Manuals: Organize operating and maintenance data into suitable sets of manageable size. Bind properly indexed data in individual heavy-duty 2-inch, 3-ring vinyl-covered binders, with pocket folders for folded sheet information. Mark appropriate identification on front and spine of each binder. Include the following types of information:
1. Emergency instructions.
 2. Copies of warranties.
 3. Recommended maintenance.
 4. Inspection procedures.
 5. Product Data.

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- H. Submit (2) hard copies and one thumb drive with PDF electronic files of marked-up and final documents to Architect/Engineer with claim for final Application for Payment.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 CLOSEOUT PROCEDURES

- A. Operating and Maintenance Instructions: 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:
 - 1. Maintenance manuals.
 - 2. Record documents.
 - 3. Hazards.
 - 4. Cleaning.
 - 5. Warranties and bonds.
 - 6. Maintenance agreements and similar continuing commitments.

3.2 FINAL CLEANING

- A. General: General cleaning during construction is required by the General Conditions and as required under applicable specifications sections (Division 2 thru 12).
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to the condition expected in a normal, commercial building cleaning and maintenance program. Comply with manufacturer's instructions.
 - 1. Clean transparent materials, including glass in doors and windows from any construction debris. Replace chipped or broken glass (from construction debris) and other damaged (during construction activities) transparent materials.
 - 2. Clean exposed exterior hard-surfaced finishes to a dust-free condition, free of stains, films and similar foreign substances. Leave concrete floors broom clean.

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3. Clean the construction site, including landscape areas, of rubbish, litter and other foreign substances caused by construction activities. Sweep paved areas broom clean; remove stains, spills and other foreign deposits.
 4. Execute final cleaning prior to final inspection.
 5. Clean interior and exterior surfaces exposed to view. Vacuum carpeted and soft surfaces.
 6. Clean, Replace filters of operating equipment.
 7. Remove waste and surplus materials, rubbish, and construction facilities from site.
- C. Removal of Protection: Remove temporary protection and facilities installed for protection of the Work during construction.
- D. Compliance: Comply with regulations of authorities having jurisdiction and safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on the Owner's property. Do not discharge volatile, harmful or dangerous materials into drainage systems. Remove waste materials from the site and dispose of in a lawful manner.
1. Where extra materials of value remaining after completion of associated Work have become the Owner's property, arrange for disposition of these materials as directed.

END OF SECTION 01700

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SECTION 01800 - GUARANTEE - WARRANTY

PART ONE - GENERAL

1.01 GUARANTEE PERIOD

- A. The General Contractor shall and hereby does guarantee and warrant that all work for this building, under this Contract, shall be free from defects or faulty labor and/or materials for a period of **two (2) years** from the date of Final Acceptance of same, except when longer periods are herein specified, which develop within any guarantee periods.

1.02 FINAL PAYMENT

- A. Final payment is contingent upon the Owner's Representative's receipt of such guarantees and/or warranties from the General Contractor.

END OF SECTION 01800

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SECTION 02070 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section requires the selective removal and subsequent offsite disposal of the following:
 - 1. Portions of existing finishes indicated on drawings and as required to accommodate new finishes.
 - 2. Removal of existing hollow metal frames as indicated on the drawings.
 - 3. Removal of existing rolling counter doors and all associated material as shown on the drawings.
 - 4. Removal and protection of existing fixtures, Food Service equipment materials, and equipment items indicated "salvage" and/or return to Owner.
 - 5. Removal of existing concrete slabs, flooring and ceilings, lighting, etc. as indicated or required for new construction.
 - 5. Shoring and removal of existing lintels and masonry walls.
- B. Removal work specified elsewhere:
 - 1. Cutting nonstructural concrete floors and masonry walls for piping, ducts, and conduits is included with the work of the respective mechanical and electrical specification sections in Divisions 23 and 26.
- C. Related work specified elsewhere:
 - 1. Remodeling construction work and patching are included within the respective sections of specifications, including removal of materials for reuse and incorporation into remodeling or new construction.

2. Relocation of pipes, conduits, ducts and other mechanical and electrical work is specified in other divisions.

1.3 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
- B. Schedule indicating proposed sequence of operations for selective demolition work to the Owner for review prior to start of work. Include coordination for shutoff, capping, and continuation of utility services as required, together with details for dust and noise control protection.
- C. Photographs of existing conditions of structure surfaces, equipment, and adjacent improvements that might be misconstrued as damage related to removal operations. File with the Owner prior to start of work.

1.4 JOB CONDITIONS

- A. Occupancy: Owner will occupy portions of the building immediately adjacent to areas of selective demolition. Conduct selective demolition work in manner that will minimize need for disruption of Owner's normal operations. Provide minimum of (72) hours advance notice to Owner of demolition activities that will affect Owner's normal operations.
- B. Condition of Structures: Owner assumes no responsibility for actual condition of items or structures to be demolished.
 1. Conditions existing at time of inspection for bidding purposes will be maintained by Owner insofar as practicable. However, minor variations within structure may occur by Owner's removal and salvage operations prior to start of selective demolition work.
- C. Partial Demolition and Removal: Items indicated to be removed but of salvageable value to the Contractor may be removed from structure as work progresses. Transport salvaged items from site as they are removed.
 1. Storage or sale of removed items on site will not be permitted.

- D. Protections: Provide temporary barricades and other forms of protection to protect Owner's personnel and general public from injury due to selective demolition work.
1. Provide protective measures as required to provide free and safe passage of Owner's personnel and general public to occupied portions of building.
 2. Provide interior and exterior shoring, bracing, or support to prevent movement, settlement, or collapse of structure or element to be demolished and adjacent facilities or work to remain.
 3. Protect from damage existing finish work that is to remain in place and becomes exposed during demolition operations.
 4. Protect floors with suitable coverings when necessary.
 5. Construct temporary insulated one hour fire rated dustproof partitions where required to separate areas where noisy or extensive dirt or dust operations are performed. Equip partitions with dustproof doors and security locks.
 6. Remove protections at completion of work.
- E. Damages: Promptly repair damages caused to adjacent facilities by demolition work.
- F. Traffic: Conduct selective demolition operations and debris removal to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities.
1. Do not close, block, or otherwise obstruct streets, walks, or other occupied or used facilities without written permission from authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.
- G. Flame Cutting: Do not use cutting torches for removal until work area is cleared of flammable materials. At concealed spaces, such as interior of ducts and pipe spaces, verify condition of hidden space before starting flame-cutting operations. Maintain portable fire suppression devices during flame-cutting operations.

- H. Utility Services: Maintain existing utilities indicated to remain in service and protect them against damage during demolition operations.
1. Do not interrupt utilities serving occupied or used facilities, except when authorized in writing by authorities having jurisdiction. Provide temporary services during interruptions to existing utilities, as acceptable to governing authorities.
 2. Maintain fire protection services during selective demolition operations.
- I. Environmental Controls: Use water sprinkling, temporary enclosures, and other methods to limit dust and dirt migration. Comply with governing regulations pertaining to environmental protection.
1. Do not use water when it may create hazardous or objectionable conditions such as ice, flooding, and pollution.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 PREPARATION

- A. General: Provide interior and exterior shoring, bracing, or support to prevent movement, settlement, or collapse of areas to be demolished and adjacent facilities to remain.
1. Cease operations and notify the General Contractor, Owner and Architect immediately if safety of structure appears to be endangered. Take precautions to support structure until determination is made for continuing operations.
 2. Cover and protect furniture, equipment, and fixtures from soilage or damage when demolition work is performed in areas where such items have not been removed.
 3. Erect and maintain fire rated dustproof partitions and closures as required to prevent spread of dust or fumes to occupied portions of the building.

- a. Where selective demolition occurs immediately adjacent to occupied portions of the building, construct fire rated dust-proof partitions of minimum 4-inch studs, 5/8-inch drywall (joints taped) on occupied side, 1/2-inch fire-retardant plywood on demolition side. Fill partition cavity with sound-deadening insulation.
 - b. Provide weatherproof closures for exterior openings resulting from demolition work.
4. Locate, identify, stub off, and disconnect utility services that are not indicated to remain.
- a. Provide bypass connections as necessary to maintain continuity of service to occupied areas of building. Provide minimum of (72) hours advance notice to Owner if shutdown of service is necessary during changeover.

3.2DEMOLITION

- A. General: Perform selective demolition work in a systematic manner. Use such methods as required to complete work indicated on Drawings in accordance with demolition schedule and governing regulations.
1. Locate demolition equipment throughout structure and promptly remove debris to avoid imposing excessive loads on supporting walls, floors, or framing.
 2. Provide services for effective air and water pollution controls as required by local authorities having jurisdiction.
- B. If unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure both nature and extent of the conflict. Submit report to the Owner in written, accurate detail. Pending receipt of directive from the Owner, rearrange selective demolition schedule as necessary to continue overall job progress without undue delay.

3.3 SALVAGED MATERIALS

- A. Salvaged Items: Where indicated on Drawings as "Salvage - Deliver to Owner," carefully remove indicated items, clean, store, and turn over to Owner and obtain receipt.
 - 1. Historic artifacts, including cornerstones and their contents, commemorative plaques and tablets, antiques, and other articles of historic significance, remain property of Owner. Notify the General Contractor if such items are encountered and obtain acceptance regarding method of removal and salvage for Owner.

3.4 DISPOSAL OF DEMOLISHED MATERIALS

- A. Remove from building site debris, rubbish, and other materials resulting from demolition operations. Transport and legally dispose off site.
 - 1. If hazardous materials are encountered during demolition operations, comply with applicable regulations, laws, and ordinances concerning removal, handling, and protection against exposure or environmental pollution.
 - 2. Burning of removed materials is not permitted on project site.

3.5 CLEANUP AND REPAIR

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

END OF SECTION 02070

SECTION 02925 - CLEANUP AND RESTORATION

PART 1 - GENERAL

- A. The Contractor shall restore areas disturbed by construction activities to a condition reasonably close to their condition before the project, unless shown otherwise on the plans. Restoration work should be performed as soon as possible after construction work is completed in a particular area.
- B. Upon the completion of work in an area, all excess materials, debris, equipment, and similar items shall be removed from the project area by the Contractor, and disposed of properly.

PART 2 - MATERIALS

Not Applicable.

PART 3 - EXECUTION

3.01 Restoration

- A. Unless otherwise provided; aggregate surfaces, bituminous pavements, and concrete pavements shall be restored by construction of similar replacement surfaces. Bituminous, concrete and aggregate surfaces shall be replaced with the materials and thicknesses to match existing.
- B. Turf areas shall be restored by re-establishing the turf as described in the specification for turf establishment. All areas disturbed by construction that are not to be surfaced with aggregate or pavement shall be restored with turf, unless otherwise directed.
- C. Mailboxes, fences, signs, ornaments, and similar items shall be replaced at the completion of construction. Posts shall be installed plumb. Items that are lost or stolen shall be repaired or replaced at the Contractor's expense. Repairs or replacements shall meet the Owner's approval.

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FREEZER REPLACEMENT

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3.02 Temporary Restoration of Driving Surfaces

- A. Where a pavement or gravel surface is removed as a result of construction activities, a temporary surface shall be provided and maintained by the Contractor until the permanent surface is provided. Unless otherwise directed, the temporary surface shall be twelve inches of aggregate compacted to at least 95 percent of its maximum density (ASTM D1557) and graded to meet the adjacent, remaining surfaces. Aggregate shall meet the requirements of Series 23A as described in the 2003 Michigan Department of Transportation Specifications.

- B. The Contractor shall regrade the temporary surface and add additional aggregate at intervals necessary to maintain them in a relatively smooth condition.

END OF SECTION 02925

SECTION 03001 - CONCRETE

PART 1. GENERAL

1.01 RELATED DOCUMENTS

- A. Attention is directed to Division 0, Bidding and Contract Requirements, and to Division 1, General Requirements, which are hereby made a part of this specification.

1.02 SECTION INCLUDES

- A. Work included in this section includes furnishing all labor, materials, equipment and incidentals required for complete installation of formwork, reinforcement, accessories, cast-in-place concrete, finishing and curing. This section pertains to building concrete work.

1.03 SUBMITTALS

- A. Comply with ACI 315 "Manual of Standard Practice for Detailing Reinforced Concrete Structures". Indicate reinforcement sizes, spacings, locations, and quantities, bending and cutting schedules, supporting and spacing devices.
- B. See drawings for General Notes and Special Conditions.
- C. Provide data on joint devices, attachment accessories, mix design for each type concrete, proportions of all ingredients, admixtures, slump range, expected strength and water cement ratio. Provide historical test data with each proposed mix design.

1.04 QUALITY ASSURANCES

- A. Building Code Requirements for Structural Concrete (ACI 318) and latest supplements thereto.
- B. Standard Practice for Selecting Proportions for Normal, Heavy Weight, and Mass Concrete (ACI 211.1).
- C. "Hot Weather Concreting" (ACI-305R).
- D. "Cold Weather Concreting" (ACI-306R).

- E. Guide for Measuring, Mixing, Transporting and Placing Concrete (ACI 304R).
- F. Standard Practice for Curing Concrete (ACI 308).
- G. Specification for Structural Concrete (ACI 301).
- H. Guide for Concrete Floor and Slab Construction (ACI 302.1R).
- I. Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete (ASTM C618).
- J. Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type) - (ASTM D994).
- K. Guide to Formwork for Concrete (ACI 347R).
- L. Concrete Reinforcing Steel Institute (CRSI) "Manual of Standard Practice.
- M. Design and workmanship of all concrete shall be in accordance with referenced specifications and code listed above. Quality, tolerances, and level of performance of work shall be as specified therein. Contractor shall keep on file, in project office, current copies of all references listed above.

PART 2. PRODUCTS

2.01 FORM MATERIALS

- A. Form Material for Exposed Concrete: Plywood; 5/8" APA B-B plyform Class 1, exterior. Use plywood thickness sufficient to support concrete at temperature and rate of pour. Use only sound, undamaged sheets with clean, true edges. Furnish in largest sizes to minimize joints.
- B. Form Material for Unexposed Concrete: Plywood; 5/8" APA B-B-G-2, exposure 1, exterior, plywood graded per PS-1 standards for construction and industrial plywood. Use plywood thickness sufficient to support concrete at temperature and rate of pour. Use only sound, undamaged sheets with clean, true edges. Lumber shall be standard grade or better.

- C. In lieu of "A" above, the material specified under "B" may be used for exposed concrete if a 3/16" smooth one side, treated, pressed fiberboard liner is utilized.
- D. Lumber for light framing (less than 6" wide): standard grade and species. Framing (6" wider and from 2" to 4" thick): provide No. 1 grade in one of the following species:
 - 1. Douglas Fir (WWPA).
 - 2. Southern Pine (SPIB).
 - 3. Redwood (RIS).
- E. Prefabricated steel or metal shall be minimum 16 ga. as approved to produce surfaces equal to those specified for wood. Forms shall be matched, tight fitting, and stiffened to support weight of concrete.
- F. Form Ties: Bolt and rod type so designed that upon removal of the form no metal shall be within 1-1/2" of the concrete surface and no holes larger than 1" in diameter. Concrete exposed to the exterior shall utilize galvanized ties.
- G. Dovetail Anchor Slots: Galvanized steel, foam filled, release tape sealed slots, bond tab anchors as manufactured by Heckmann, Hohmann & Barnard, Inc. or approved.
- H. Form Release Agent: Colorless mineral oil which will not stain the concrete or impair natural bonding characteristics of coating intended for use on concrete.
- I. Formed Construction Joints for Slab-on-Grade: Galvanized steel, tongue and groove type profile with knockout holes to receive doweling, min. 26 gage unless noted otherwise. Size and profile as indicated on drawings or as required to fit field conditions.
- J. Slab Edge Joint Filler: ASTM D994, premolded asphaltic board, thickness as indicated or (if not indicated, 1/2" thick minimum).

K. Vapor Barrier: Conforming to ASTM E1745 Class A, non-woven, .01 permeance, not less than 15 mils thick.

1. Acceptable Manufacturers:

- a. Stego wrap 15 mil vapor barrier by Stego Industries.
- b. WR Meadows Perminator 15 mil.
- c. Zero-perm by Alumiseal.
- d. Vaporblock VB15 by Raven Industries.
- e. Husky yellow guard 15 mil vapor barrier by Poly-America L.P.

L. 6 mil thick, clear polyethylene film (for bond break between walls and floor), type recommended for below grade application.

M. Nails, spikes, lag bolts, through bolts, anchorages: Size as required, of sufficient strength and character to maintain formwork in place while placing concrete.

2.02 REINFORCEMENT MATERIALS

A. Reinforcing Bars: ASTM A 615 Grade 60 deformed.

B. Welded Wire Fabric: ASTM A 185, welded steel wire fabric.

C. Supports for Reinforcement: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire fabric in place. Use wire bar-type supports complying with CRSI specifications.

1. For slabs-on-grade, use supports with sand plates or horizontal runners where base material will not support chair legs.
2. For exposed-to-view concrete surfaces where lags of supports are in contact with forms, provide supports with legs that are protected by plastic (CRSI, Class 1) or stainless steel (CRSI, Class 2).

2.03 CONCRETE MATERIALS

A. Cement; controlling specification for Portland Cement, ASTM C150, Type I-Normal or Type II.

- B. Aggregates shall conform to ASTM C-33. Maximum size of aggregate shall not be larger than $1/5$ of narrowest dimension between forms of member for which concrete is to be used, nor larger than $3/4$ of minimum clear spacing between reinforcing bars, nor larger than $1/3$ of slab depth.
- C. Lightweight aggregates shall conform to ASTM C 330.
- D. Water: Clean and potable.
- E. Air Entrainment Admixture: ASTM C260, as manufactured by Master Builders, Euclid, or W.R. Grace.
- F. Chemical Admixtures: ASTM C494; Type 'A' - water reducing; Type 'B' - retarding, Type 'C' - accelerating, Type 'D' - water reducing and regarding, Type 'E' - water reducing and accelerating, Type 'F' - water reducing high range; Type 'G' - water reducing high range and retarding. Calcium chloride or admixtures containing more than .05 percent chloride ions by weight of admixture shall not be used. Each admixture shall not contribute more than 5 ppm by weight, of chloride ions to the total concrete constituent. Use admixtures in strict compliance with manufacturer's directions.
- G. Bonding Agent: Polymer resin emulsion, W.R. Grace or reviewed/approved equal.
- H. Non-Shrink Grout: Non-shrink type, pre-mixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents. Capable of developing a minimum compressive strength of 7000 psi at 28 days.
- I. Adhesive Anchoring: Injectable adhesive or self-contained capsule as manufactured by:
 - 1. 'Hilti' HIT System, or Architect approved/reviewed equal.

2.04 CURING COMPOUNDS & SEALERS

- A. Curing Compound/Sealer: Liquid curing compound, water base, concrete curing-sealing compound, VOC (volatile organic content) compliant, containing fugitive dye that does not leave residue (resin, varnish, wax, etc.). Fugitive dye must disappear in 7 days, as manufactured by:
1. Sonneborn Building Products, Kure-N-Seal W.
 2. Dayton Superior Corporation, Safe Cure & Seal (J-18).
 3. Burke by EDOCO Spartan-Cote WB Cure Seal Hardener.
 4. MasterKure 100W, Master Builders, Inc.
 5. Vocomp-20, W.R. Meadows.
- B. Absorptive Mats: Burlap cloth, commercial quality suitable for purpose. Constructed of jute or kenaf, weighing approximately 9 oz. per square yard, complying with AASHTO M182, Class 2.
- C. Moisture retaining cover, complying with ASTM C171; one of the following: waterproof paper, polyethylene film, or polyethylene coated burlap.
- D. Crack Repair Material: Floor slabs - 2 part, 100% solid epoxy adhesive in formulation recommended by manufacturer for application, as manufactured by:
1. W.R. Meadows Reziweld 1000 or Architect approved/reviewed equal.
- E. Cure/Sealer Interior Exposed Concrete Floors: Curing compound, non-residual or dissipating resin curing compound. Product of sealer manufacturer and meeting sealer manufacturer's requirements. Manufacturers to include:
1. Dayton Superior Corp "Day-Chem Sil-Cure" (J-13).
 2. L & M Cure or Cure R.

2.05 CONCRETE MIX

- A. Mix concrete in accordance with ACI 304 and deliver concrete in accordance with ASTM C94.

- B. Quality working stresses for the design of this project shall be based on specific minimum 28-day compressive strength of concrete or on specified minimum compressive strength at earlier age at which concrete may be expected to receive full load. Provide concrete of the following properties:
1. All concrete - 3500 psi. 28-day compressive strength; water-cement ratio, 0.51 maximum (non-air-entrained). 4000 psi. 28-day compressive strength; water-cement ratio, 0.44 maximum (non-air entrained).
- C. Slump Limits: Proportion and design mixes to result in concrete slump at the point of placement as follows:
1. All Concrete: Not less than 1" & not more than 4".
 2. Concrete containing high-range water-reducing admixture (superplasticizer). Not more than 8 inches after adding admixture to site-verified 2-3 inch slump concrete.
 3. Site added water to increase slump is strictly prohibited.
- D. Proportions of aggregate to cement shall be such as to produce a mixture which will work readily into corners, angles of forms, and around reinforcement without permitting materials to segregate. Excess free water shall not collect on concrete surface.
- E. Select admixture proportions for normal weight concrete in accordance with ACI 301, Method 1 and in strict accordance with manufacturer's instructions.
- F. Adjustment to concrete mixes: Mix design adjustments may be requested by Contractor when characteristics of materials, job conditions, weather or other circumstances warrant, as accepted by the Architect. Laboratory test data for revised mix design and strength results must be submitted to and accepted by Architect before using in work.

PART 3. EXECUTION

3.01 FORMWORK ERECTION

- A. Erect formwork, shoring and bracing to achieve design requirements. Fabricate forms for easy removal without hammering or prying against exposed concrete surfaces.
- B. Provide bracing to ensure stability of formwork.
- C. Apply form release agent to formwork in accordance with manufacturer's instructions, prior to placing for accessories and reinforcement.
- D. Do not apply form release agent where concrete surfaces will receive special finishes or applied coverings which are affected by agent.
- E. Clean forms as erection proceeds, to remove foreign matter.
- F. Footings and foundations shall be formed, notched and/or sleeved as indicated to provide for installation of mechanical or plumbing piping.
- G. Forms shall conform to shape, lines and dimensions of members as called for, substantially and sufficiently tight to prevent leakage of concrete.
- H. Forms shall be properly braced, and tied together so as to maintain position and shape. Forms for exposed concrete shall be braced so as to provide dimensions called for, and have taped joints.
- I. Construction joints, whether indicated on drawings or not, shall be made or located so as to least impair strength of the structure. Where joint is to be made, the surface of the concrete shall be thoroughly cleaned and all latency removed. In addition, vertical joints shall be keyed.

3.02 INSERTS, EMBEDDED COMPONENTS, AND OPENINGS

- A. Provide formed openings where required for work to be embedded in and passing through concrete members.

B. Coordinate work of other Sections in forming and setting openings, slots, recesses, chases, sleeves, bolts, anchors and other inserts.

C. Install concrete accessories straight, level, and plumb.

3.03 REINFORCEMENT PLACEMENT

A. Place reinforcement, supported and secured against displacement.

B. Ensure reinforcing is clean, free of loose scale, dirt, or other foreign coatings.

C. Provide for continuity of reinforcing around corners in footings and walls. Lap corner bars 30 bar diameters.

D. Install welded wire fabric in lengths as long as practicable. Lap adjoining pieces at least one full mesh and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

3.04 PLACING CONCRETE

A. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent. Apply bonding agent in accordance with manufacturer's instructions.

B. Install vapor barrier under interior slab-on-grade.

1. Installation shall be in accordance with manufacturer's instructions and ASTM E164 3-98.

a. Unroll vapor barrier with the longest dimension parallel with the direction of the pour.

b. Lap vapor barrier over footings and seal to foundation walls.

c. Overlap joints 6 inches and seal with manufacturers tape.

d. Seal all penetrations (including pipes) per manufacturers instruction.

e. No penetration of the vapor barrier is allowed except for reinforcing steel and permanent utilities.

- f. Repair damaged areas by cutting patches of vapor barrier material overlapping the damaged area 6 inches and taping all four sides with tape.
- C. At interior slabs-on-grade locations, provide bond break from vertical surfaces consisting of 6 mil polyethylene film or 15# asphalt building paper and where indicated on plans.
- D. Place concrete continuously between predetermined control and construction joints. Do not break or interrupt successive pours such that cold joints occur. Where applicable, construction joints shall occur at control joint locations, unless noted otherwise.
- E. Concrete slabs on grade shall be constructed of thickness indicated. If thickness is not indicated, provide a minimum thickness of 4". Minimum thickness at pipes embedded in concrete shall not be less than three times o.d. of the pipe. All buried piping shall have been tested before placement of concrete.
- F. Provide interior control joints where called for on drawing as detailed. When interior construction joints occur, they shall also be considered as control joints. Provide sawed groove similar to a control joint at all construction joints.
- G. Concrete shall be conveyed from the mixer to place of final deposit by methods which will prevent separation and loss of material.
- H. All equipment used for transporting equipment shall be cleaned of all debris. Ice shall be removed from all places to be occupied by concrete forms, and masonry fillers shall be thoroughly wetted except where air temperatures are below 40 degrees F.
- I. Equipment for chuting, pumping, pneumatically conveying concrete, shall be such size and design as to insure practically continuous flow of concrete at delivery and without separation of materials.

- J. Concrete shall be deposited as soon as practicable in its final position to avoid segregation due to re-handling, flowing. Concreting shall be carried on at such rate that concrete is at all times plastic and flow readily into space between bars. No concrete that has partially hardened or has been contaminated by foreign materials shall be deposited on work, nor shall re-tempered concrete be used.
- K. Concreting, once started, shall be carried on as a continuous operation until placing of panel or section is completed. Top surface shall be generally level.
- L. All concrete shall be thoroughly compacted by suitable means during operation of placing and shall be thoroughly worked around reinforcement, embedded fixtures, and into corners of forms. Vibrator shall not be used to flow concrete.
- M. Place floor slabs in checkerboard or saw cut pattern indicated on drawings for design of construction and control joints. In all cases, spacing of control joints shall not exceed areas of 1,000 s.f.
- N. Where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels and pack with non-shrink grout or chemical adhesive. Follow manufacturer's recommendations for installation.
- O. Screed floors slabs-on-grade and concrete base for toppings level, maintaining surface flatness of maximum 1/8 inch in 10 ft.
- P. Depressed slabs: Contractor shall coordinate and verify hold-down dimensions with the trade installing items of work requiring depressed slabs; i.e. finishes and equipment, etc. Slabs shall maintain the full thickness specified or as otherwise detailed.
- Q. Protecting and sealing: Protect concrete slabs, etc., from pedestrian traffic for three days after pouring. Concrete shall be cured using two layers of burlap kept wet for minimum of 5 days; or at Contractor's option, he may use sprayed-on compound according to manufacturer's recommendations as approved by Architect. Curing method

used shall not discolor original color of concrete, nor shall white liquid curing compound be used.

- R. Provide concrete pads, bases, foundations, etc., as indicated and/or required by mechanical, electrical or other equipment supplier. Set anchor bolts for machine and equipment to templates or measurements provided.

3.05 FORM REMOVAL

- A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads.
- B. Remove formwork progressively and in accordance with code requirements.

3.06 FLOOR FINISHING

- A. Finish concrete floor surfaces in accordance with ACI 301 and ACI 302.
- B. Uniformly spread, screed, and float concrete.
- C. Wood float surfaces which will receive ceramic tile with full bed setting system.
- D. Steel trowel and light broom finish surfaces which will receive thin set quarry tile or thin set porcelain ceramic tile.
- E. Maintain surface flatness, with maximum variation of 1/8 inch in 10 ft. Corridor slabs to have overall FF=40, local FF=20.
- F. In areas with a floor drain, maintain floor level at walls and pitch surfaces uniformly to drains.
- G. Floor shall be finished without excessive floating. Delay troweling until concrete is sufficiently hard to prevent water working to surface. Bring finish to smooth level surface with minimum troweling possible.

- H. Finishes, other than floors, exposed on exterior or interior shall be formed true, free from marks, irregularities. Remove any loose material, grind all projections, fill any honeycombing or holes, finish smooth. Use carborundum stone to hand rub and provide smooth, even surface where directed.
- I. Thoroughly clean and prepare concrete floors scheduled to receive a sealer. Apply in strict accordance with manufacturer's instructions.

3.07 CURING

- A. Place absorptive matting and dampen as required.
- B. Immediately after placement, protect concrete from premature drying.
- C. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
- D. Provisions shall be made for maintaining concrete in moist condition for at least (5) five days after placement, except high early concrete which shall be cured for at least 2 days.
- E. Cold Weather Requirements:
 - 1. General: Except as modified herein, all work shall be in accordance with ACI 306R.
 - 2. Adequate equipment shall be provided for heating concrete materials and protecting concrete during freezing or near freezing weather. No frozen materials or materials containing ice shall be used.
 - 3. All concrete materials, all reinforcement, forms, fillers, ground with which concrete is to come in contact shall be free from frost. Whenever temperature of surrounding air is below 40° F., all concrete placed in forms shall have a temperature of between 70° F., 80°F. Adequate means shall be provided for maintaining temperature of not less than 70° F. for 3 days, 50° F. for 5 days, except high-early concrete shall have temperature maintained at not less than 70° F. for 2

days, 50° F. for 3 days, or for as much more time as necessary to insure proper curing. Housing, covering, other protection used in connection with curing shall remain in place at least 24 hours after artificial heating is discontinued. No dependence shall be placed on salt or other chemicals for prevention of freezing.

F. Weather Conditions:

1. In hot weather, sprinkle and cover all concrete for at least 24 hours longer than specified for normal curing periods. In hot weather work shall be in accordance with ACI 305R.
2. In weather when temperature falls below freezing, and in any event between December 1 and April 1, no concrete shall be poured without adequate frost protection.

3.08 CONCRETE FINISHING

- A. Provide concrete surfaces to be left exposed, concrete walls, columns, etc., with smooth rubbed finish not later than one day after form removal.
 1. Moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.

3.09 FIELD QUALITY CONTROL

- A. Inspection and testing shall be performed by an independent firm selected by the Owner and retained by the Contractor, in accordance with Division 1, Section 01400 "Quality Control".
- B. The Contractor shall notify the Architect/Engineer and the Testing Lab at least (5) five days prior to the commencement of concrete operations.
- C. See Division 1 for inspection and testing allowances, Section 01400 "Quality Control".

- D. Specimens shall be molded and cured as per ASTM C31. Three specimens per test, not less than one test for each day's pour, each 50 yards concrete poured, each building unit, or each strength concrete. Specimens shall be laboratory cured.
- E. Specimens shall be tested in accordance with ASTM C39. One specimen shall be tested at 7 days, two at 28 days.
- F. When average strength of laboratory control cylinders fall below required compressive strength, Architect shall have right to order change in proportions and water content for remainder of structure. Architect shall have right to require tests as per ACI Building Code; Chapter 20 where load tests show concrete does not conform with drawings or specifications. Deficiency shall be corrected without additional cost to Owner.
- G. Provide PDF copy of test reports at (7) days and (28) days, which shall be sent directly to the Architect by the Testing Laboratory, with all required information shown.
- H. Slump tests per ASTM C-172 and C-143, minimum of one test for each set of cylinders, or more as conditions warrant. Deliveries exceeding specified slump shall be rejected.

3.10 DEFECTIVE CONCRETE

- A. Modify or replace concrete not conforming to required lines, details and elevations, as directed by the Architect/Engineer.
- B. Failure of concrete topping to bond to substrate (as evidenced by a hollow sound when tapped), or disintegration or other failure of topping to perform as a floor finish, will be considered failure of materials and workmanship. Repair or replace toppings in areas of such failures, as directed.

END OF SECTION 03001

SECTION 03300 - BONDING AGENTS FOR CONCRETE

PART 1. GENERAL

1.01 SUMMARY

- A. This specification describes the use of a bonding bridge between new portland-cement mortar or concrete and hardened portland-cement mortar or concrete.

1.02 QUALITY ASSURANCE

- A. Manufacturing qualifications: The manufacturer of the specified product shall have in existence a recognized quality assurance program and be ISO 9001 Certified, a program of training, certifying and technically supporting a nationally-organized Approved Contractor Program with a re-certification program of its participants for a minimum of 5 years.
- B. Contractor qualifications: Contractor shall be an Approved Contractor of the manufacturer of the specified product, who has completed a program of instruction in the use of the specified coating material, and provides a certification from the manufacturer attesting to its Approved Contractor status.
- C. Install materials in accordance with all safety and weather conditions required by manufacturer, or as modified by applicable rules and regulations of local, state and federal authorities having jurisdiction. Consult Material Safety Data Sheets for complete handling recommendations.

1.03 DELIVERY, STORAGE AND HANDLING

- A. All materials must be delivered in original, unopened containers with the manufacturer's name, labels, product identification, and batch numbers. Damaged material must be removed from the site immediately.
- B. Store all materials off the ground and protect from rain, freezing or excessive heat until ready for use.
- C. Condition the specified product as recommended by the manufacturer.

1.04 JOB CONDITIONS

- A. Environmental Conditions: Do not apply material if it is raining or snowing or if such conditions appear to be imminent. Minimum application temperature 40°F (5°C) and rising.

- B. Protection: Precautions should be taken to avoid damage to any surface near the work zone due to mixing and handling of the specified coating.

1.05 SUBMITTALS

- A. Submit PDF copy of manufacturer's literature, to include: Product Data Sheet, System Data Sheet, Application Guide, and appropriate Material Safety Data Sheets (MSDS).
- B. Submit PDF copy of Certificate of Approved Contractor status by manufacturer.

1.06 WARRANTY

- A. Provide a written warranty from the manufacturer against defects of materials for a period of (5) five years, beginning with date of substantial completion of the project.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Sika Armatec 110 EpoCem, as manufactured by Sika Corporation, 201 Polito Avenue, Lyndhurst, NJ 07071 is considered to conform to the requirements of this specification.

2.02 MATERIALS

- A. Epoxy resin/portland cement adhesive shall be Sika Armatec 110 EpoCem.
 - 1. Component "A" shall be an epoxy resin/water emulsion containing suitable viscosity control agents. It shall not contain butyl glycidyl ether.
 - 2. Component "B" shall be primarily a water solution of a polyamine.
 - 3. Component "C" shall be a blend of selected portland cements and sands.
 - 4. The material shall not contain asbestos.

2.03 PERFORMANCE CRITERIA

- A. Properties of the mixed epoxy resin/portland cement adhesive.
1. Pot Life: 90 minutes @ 73°F.
 2. Contact Time:

| | |
|-------------|----------|
| 95°F (35°C) | 6 hours |
| 68°F (20°C) | 12 hours |
| 50°F (10°C) | 16 hours |
| 40°F (5°C) | 24 hours |
 3. Color: Dark gray
- B. Properties of the cured epoxy resin/portland cement adhesive.
1. Compressive Strength (ASTM C-109)
 - a. 3 day: 4500 psi (31.0 MPa)
 - b. 7 day: 6500 psi (44.8 MPa)
 - c. 28 day: 8500 psi (58.6 MPa)
 2. Splitting Tensile Strength (ASTM C-496)
 - a. 28 days: 600 psi (4.1 MPa)
 3. Flexural Strength (ASTM C-348)
 - a. 1250 psi (8.6 MPa)
 4. Bond Strength ASTM C-882 at 14 days
 - a. Wet on Wet, 0-hr. open time: 2800 psi (19.3 MPa)
 - b. 24-hr. open time: 2600 psi (17.9 MPa)
 5. Bond of Steel Reinforcement to Concrete (Pullout Test)
 - a. Sika Armatec 110 coated: 625 psi (4.3 MPa)
 - b. Epoxy coated: 508 psi (3.5 MPa)
 - c. Plain Reinforcement: 573 psi (3.95 MPa)
 6. The epoxy resin/portland cement adhesive shall not produce a vapor barrier.
 7. Material must be proven to prevent corrosion of reinforcing steel when tested under the procedures as set forth by the Federal Highway Administration Program Report No. FHWA/RD86/193. Proof shall be in the form of an independent testing laboratory corrosion report showing prevention of corrosion of the reinforcing steel.

Note: Tests above were performed with material and curing conditions at 73°F and 45-55% relative humidity.

PART 3 - EXECUTION

3.01 MIXING AND APPLICATION

- A. Mixing the epoxy resin: Shake contents of Components "A" and Component "B". Completely empty both components into a clean, dry mixing pail. Mix thoroughly for 30 seconds using a jiffy paddle with a low-speed (400-600 rpm) drill. Slowly add the entire contents of Component "C" while continuing to mix for 3 minutes until uniform with no lumps. Mix only that quantity that can be applied within its pot life.
 - B. Placement procedure for Bonding bridge:
 1. Apply to prepared surface with a stiff-bristle brush, broom or "hopper-type" spray equipment.
 - a. For hand-applied mortars-Place fresh, plastic concrete/mortar while the bonding bridge adhesive is "wet" or within open times indicated in section 2.03.A.2.
 - b. For machine-applied mortars-Apply while the bonding bridge adhesive is "wet" or within the open times indicated in section 2.03.A.2.
 - C. Placement procedures for anti-corrosion coating:
 1. Apply to prepared steel surface with a stiff-bristle brush, or "hopper type" spray equipment at 20 mils minimum thickness. Properly coat the underside of the totally exposed steel. Allow to dry (approx 2-3 hours) then apply a second coat at 20 mils minimum thickness. Allow drying again before placing repair mortar.
- *During the anti-corrosion coating method, after applying the second coat Sika Armatec 110 EpoCem, a mortar can be applied to "wet" Sika Armatec 110 EpoCem or within open times indicated in section 2.03.A.2 to achieve the benefit of bonding bridge.
- D. Adhere to all limitations and cautions for the epoxy resin/portland cement adhesive in the manufacturer's current printed literature.

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3.02 CLEANING

- A. The uncured epoxy resin/portland cement adhesive can be cleaned from tools with water. The cured epoxy resin/portland cement adhesive can only be removed mechanically.
- B. Leave finished work and work area in a neat, clean condition without evidence of spillovers onto adjacent areas.

END OF SECTION 03300

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SECTION 04100 - MORTAR & GROUT

PART 1. GENERAL

1.01 RELATED DOCUMENTS

- A. Attention is directed to Division 0, Bidding and Contract Requirements, and to Division 1, General Requirements, which are hereby made a part of this specification.

1.02 SECTION INCLUDES

- A. Work included in this section consists of furnishing all labor, materials, equipment, and incidentals required for complete installation of mortar and grout for masonry.

1.03 ENVIRONMENTAL REQUIREMENTS

- A. Recommended Practices for Hot and Cold Weather Masonry Construction as published by the Masonry Industry Council.

PART 2. PRODUCTS

2.01 MATERIALS

- A. Portland Cement: ASTM C150, Type 1 provide natural color or white cement as required to provide mortar color indicated.
- B. Mortar Aggregate: ASTM C144, standard masonry type.
- C. Hydrated Lime: ASTM C207, Type 'S', or 'N'.
- D. Masonry Cement: ASTM C91.
- E. Premix Mortar: ASTM C387.
- F. Grout Aggregate: ASTM C404.
- G. Grout Fine Aggregate: ASTM C144, 100% passing #8 sieve, maximum 5-30% passing #50 sieve.
- H. Water: Clean and potable.

I. Plasticizer:

1. SIKA Chemical Corporation "Intraplast Z".
2. Euclid Chemical Co. "Eucon BK-S".

J. Storage of all material shall prevent the intrusion of foreign matter. Store all masonry units on the ground, protected against damage and intrusion of excess moisture. No damaged or deteriorated materials shall be used.

2.02 MORTAR MIXES

- A. Mortar for interior non-load bearing walls and partitions: ASTM C270, Type 'S', using the property method.
- B. Mortar for reinforced masonry ASTM C270, Type 'S', using the property method.
- C. Pointing mortar for masonry ASTM C270, Type 'N', using the property method.
- D. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes. Use only pigments with a record of satisfactory performance in masonry mortars.
- E. Ready-Mixed Mortar: Cementitious materials, water, and aggregate complying with requirements specified in this Article; combined with set-controlling admixtures to produce a ready-mixed mortar complying with ASTM C 1142.
- F. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494, Type C, and recommended by the manufacturer for use in masonry mortar of composition indicated.

2.03 MORTAR MIXING

- A. Thoroughly mix mortar ingredients in approved type mixing machine in quantities needed for immediate use in accordance with ASTM C270 or C780. Discharge mixer completely before recharging.

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- B. Blend admixtures in accordance with manufacturer's instructions.
- C. Do not use anti-freeze compounds to lower the freezing point of mortar.

2.04 GROUT MIXES

- A. Bond beams, lintels, engineered masonry, reinforced masonry walls: min. 2500 psi strength at 28 days unless noted otherwise; 8-10 inches slump; pre-mixed grout in accordance with ASTM C94, or batch mixed in accordance with ASTM C476 for fine or course grout.

PART 3. EXECUTION

3.01 EXAMINATION AND PREPARATION

- A. Apply bonding agent to existing concrete surfaces.

3.02 INSTALLATION

- A. Install pre-mix mortar and grout in accordance with manufacturer's instructions.
- B. Work grout into masonry cores and cavities to eliminate voids. Do not displace reinforcement. Reinforcing shall be mechanically anchored in masonry cores to prevent displacement during grouting.

END OF SECTION 04100

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SECTION 04300 - UNIT MASONRY

PART 1. GENERAL

1.01 RELATED DOCUMENTS

- A. Attention is directed to Division 0, Bidding and Contract Requirements, and to Division 1, General Requirements, which are hereby made a part of this specification.

1.02 SECTION INCLUDES

- A. Work included in this section consists of furnishing all labor, materials, equipment and incidentals required for complete installation of concrete masonry and brick units including installation of reinforcement, anchorage and accessories.

- B. Related work specified elsewhere:

- 1. Section 04100 - Mortar & grout.
- 2. Section 09972 - Concrete and Masonry Color Treatment

1.03 PERFORMANCE REQUIREMENTS

- A. Provide unit masonry that develops the following installed compressive strengths (f'm) at 28 days.

- 1. For concrete Unit Masonry: As follows, based on net area:
 - a. f'm = 2000 psi (13.79 MPa).

- 2. For brick Unit Masonry: As follows, based on gross area:
 - a. f'm = 1500 psi (10.3 MPa).

1.04 SUBMITTALS

- A. If specifically requested by the Architect/Engineer, provide samples for verification as follows.

- 1. Full size units for each difference exposed masonry unit required showing the full range of exposed colors, textures, and dimensions to be expected in the completed construction.
- 2. Accessories embedded in the masonry.

1.05 QUALITY ASSURANCE

- A. Fire-Resistance Ratings: Where indicated, provide materials and construction identical to those of assemblies with fire resistance ratings determined per ASTM E 119 by a testing and inspecting agency, by equivalent concrete masonry thickness, or by another means, as acceptable to authorities having jurisdiction.
- B. Single-Source Responsibility for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from one source and by a single manufacturer for each different product required.
- C. Single-Source Responsibility for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from one manufacturer for each cementitious component and from one source or producer for each aggregate.

1.06 ENVIRONMENTAL REQUIREMENTS

- A. Hot and Cold weather requirements: Recommended Practices for Hot or Cold Weather Masonry Construction as published by the Masonry Industry Council.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Store masonry units on elevated platforms, under cover, and in a dry location to prevent their deterioration or damage due to moisture, temperature changes, contaminants, corrosion, and other causes. If units become wet, do not install until they are in an air-dried condition.
- B. Store cementitious materials on elevated platforms, under cover, and in a dry location.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
- D. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

PART 2. PRODUCTS

2.01 CONCRETE MASONRY UNITS

- A. Concrete block (CMU): ASTM C90, medium weight unless noted otherwise (105-125 pcf) normal weight 125 pcf min. Use for above and below grade, exterior or interior wall applications.
- B. Texture of exposed faces of block shall be uniform for all block used in this project. Solid units may be used for bearing under structural members. No units with exposed chipped surfaces will be permitted in areas where exposed.
- C. Provide shapes such as special units at pilaster blocks, bullnose all external corners, sash recesses, square ends, lintel blocks and other, as required by drawings or specifications.

2.02 BRICK UNITS

- A. Provide brick as follows: Salvage brick from building demo areas.
 - 1. Supplement brick as follows:
 - a. Provide brick allowance of a \$950/1000 brick plus tax and freight for new. New shall be stained to match existing. Refer to Spec Section 09972 Concrete and Masonry Color Treatment for additional information. Order minimum 1220 Brick for additional infill.

2.03 REINFORCEMENT AND ANCHORAGE

- A. All single wythe joint reinforcement shall be ladder type wire reinforcing consisting of No. 9 gauge deformed side rods, with No. 9 gauge standard ladder type cross rods. All rods shall be mill galvanized using ASTM A153, Class B-2 standards. Out to out spacing of side rods shall be approximately 2" less than the nominal wall thickness. Provide pre-fabricated corners and tee units as required.

- B. All multiple wythe/cavity wall joint reinforcement shall be adjustable ladder type mill galvanized in accordance with ASTM A153, Class B-2 standards. Separate adjustable ties extend to engage outer wythe by at least 2" and spaced not more than 16" o.c.
 - 1. Use where horizontal joints of facing wythe do not align with those of back-up and where indicated.
 - 2. Use where facing wythe is of different material than back-up wythe.
 - C. Adjustable Steel Wire Wall Ties (For Veneer w/CMU Backup): Formed wire 3/16" diameter high tensile, cold drawn steel wire conforming to ASTM A82, galvanized zinc coated finish, installed at 16" o.c. vertical opposite ladder reinforcing. Provide one tie per 2.66 square feet of wall area minimum.
 - D. Manufacturers:
 - 1. AA Wire Products Co.
 - 2. Dur-O-Wal.
 - 3. National Wire.
 - 4. Hohmann and Barnard, Inc.
 - 5. Wire Bond
 - 6. Other Architect Approved.
 - E. Reinforcing Steel: ASTM A615, 60-ksi-yield grade deformed steel bars unprotected finish.
- 2.04 LINTELS
- A. Lintels shall be steel, in accordance with details as shown or scheduled on the drawings.
- 2.05 ACCESSORIES
- A. Building Paper: 15# asphalt saturated felt.
 - B. Column Wrap: Waxed corrugated cardboard or 15# asphalt saturated felt.

PART 3. EXECUTION

3.01 EXAMINATION AND PREPARATION

- A. Verify that field conditions are acceptable and ready to receive work. Examine rough-in and built-in construction to verify locations prior to installation.
- B. Coordinate placement of anchors supplied to other sections.
- C. Employ skilled mechanics, experienced supervision. Lay masonry plumb, true to line, with level, accurately spaced courses. Break vertical joints unless otherwise indicated. Keep bond plumb. Rack courses, where necessary, without toothing. Lay out facing before setting, minimize cutting closures, jumping bond.
- D. Do not wet concrete masonry. Lay masonry with complete bearing in full beds of mortar. Butter sides for full vertical joints. Shove units into place. Anchor walls not otherwise bonded with ties every 8", every four (4) courses.
- E. Mix units for exposed unit masonry from several pallets as they are placed to provide a uniform blend of colors and textures.

3.02 COURSING

- A. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness. Lay out walls in advance for accurate spacing of openings, movement type joints, returns, etc. Avoid units of less than half size at corners and jambs.
- B. Block unit shall be laid in stack or running bond, as indicated on drawings with vertical joints aligned plumb, horizontal joints level. Joints in back-up work shall be worked out to provide bonding with facing masonry. Joints shall be uniform in width, thickness not to exceed 1/3". Exposed joints in finish work shall be tooled slightly concave, others shall be cut flush.

- C. Initial block course (first course above foundation) in walls (interior or exterior) shall be laid in full mortar beds on shells and cross webs; in other locations, units shall be laid in full mortar beds on shells only. Solid block units shall be laid same as brick. Vertical joints between units shall be filled with mortar between shell ends.
- D. All non-bearing walls and partitions shall terminate against beam soffits, roof, or structural ceilings, unless otherwise shown on drawings, or as stated below. Build wall to within 3/8" of overhead structure on roof, fill top joint and all voids with non-combustible insulation board which has width of 1" less than wall, then caulk joints.
- E. Both bearing and non-bearing masonry walls which enclose corridors, storage or mechanical rooms, shops, and other rooms requiring a rated separation from adjacent areas, must have the top joint as well as all voids at roof deck and elsewhere in or over these walls, filled with cement grout, mortar, or plaster bed of at least 2" in width. Where no ceilings occur in the room, said fill shall be troweled flush with the wall surface or surfaces on the exposed side of the wall.
- F. All interior block walls shall have control joints 20'-0" o.c. maximum for exterior and 25'-0" to 30'-0" at interior walls. Line up control joints with joints in foundation wall. Leave exposed faces on joints ready for caulking. Provide vertical reinforcing in grouted core on each side of exterior masonry control joints. Reinforcing to match vertical wall steel.
- G. Bond each course at corners and break vertical joints at least 2". Tee shaped or cross shaped intersecting walls shall have vertical continuous joint. These joints shall be caulked. Provide for continuity of joint reinforcing by providing pre-fabricated "T" shaped or "L" shaped units.
- H. Provide welded steel masonry reinforcing placed in every second horizontal course in all block walls with at least one layer below a window sill level and one layer above a lintel level. Lay reinforcing on wall and cover with mortar, bed unit as usual. Longitudinal wire shall be

lapped not less than 32 diameters at splices. At corners, cut inside rod and bend to proper angle.

- I. Construct bond beams as indicated with concrete grout. Maintain accurate location of reinforcing steel during grout placement.
- J. Grout course solid (or use solid units) immediately below veneer, where masonry serves as support for the veneer (i.e. brick ledges).
- K. Stopping and Resuming Work: In each course, rack back 1/2-unit length for one-half running bond or 1/3-unit length for one-third running bond; do not tooth. Clean exposed surfaces of set masonry and remove loose masonry units and mortar prior to laying fresh masonry.

3.03 PLACING AND BONDING

- A. Isolate masonry partitions from vertical structural framing members with a control joint as indicated.
- B. Isolate top joint of masonry partitions from horizontal structural framing members and slabs or decks with fire rated compressible joint filler.

3.04 REINFORCEMENT & ANCHORAGES - SINGLE WYTHE MASONRY

- A. Walls laid up with concrete block, including where used as back-up shall be reinforced with horizontal steel wall reinforcing as specified. Reinforcing shall be of proper width for block wythe, to have side wires over block shells. Place joint reinforcement at 16" o.c. vertical and continuous in first and second joint below top of walls.
- B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum of 3'-0" beyond each side of opening.
- C. Reinforcing in foundation walls (below floor slab) shall be placed every other course, continuous.

- D. Terminate reinforcing each side of control joints; lap end joints 12", form corners by cutting and lapping inside wire, bending outside wire; form intersections by cutting and lapping reinforcing from one wall with other wall. Bed side wires completely in mortar.

3.05 REINFORCEMENT & ANCHORAGES - VENEER MASONRY

- A. Install horizontal joint reinforcement 16 inches o.c. vertically. Place joint reinforcement continuous in first joint below top of walls.
- B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of opening.

3.06 LINTELS

- A. Construct concrete block lintels over window openings, door openings and other openings as indicated on the plans or otherwise required.
- B. Maintain minimum bearing each side of opening of 8" or as specified on structural drawings. Align end of lintel with vertical block joints.

3.07 GROUTED COMPONENTS

- A. Reinforce bond beam as detailed.
- B. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch of dimensioned position.
- C. Place and consolidate grout fill without displacing reinforcing.
- D. At beam bearing locations, fill masonry cores with grout for a minimum 12 inches either side of member and three courses vertical, unless otherwise noted.

3.08 ENGINEERED MASONRY

- A. Lay masonry units with core cells vertically aligned and cavities between wythes clear of mortar and unobstructed.

- B. Reinforce masonry unit cores and cavities with reinforcement bars and grout as indicated. Provide vertical bars in corners. Provide vertical bars at each side of all masonry openings. Vertical bars to continue at noted spacing above openings.
- C. Secure vertical reinforcement in position at top and bottom of cells and at intervals not exceeding 192 bar diameters. Splice reinforcement 48 bar diameters, minimum 12".
- D. Place mortar in masonry unit bed joints back 1/4 inch from edge of unit grout spaces; bevel back and upward. Permit mortar to cure 3 days before placing grout.
- E. Grout spaces less than 2 inches in width with fine grout using low lift grouting techniques. Grout spaces 2 inches or greater in width with coarse grout using high or low lift grouting techniques.
- F. When grouting is stopped for more than one hour, terminate grout 1-1/2 inch below top of upper masonry unit to form a positive key for subsequent grout placement.
- G. Low Lift Grouting: Place first lift of grout to a height of 60 inches maximum and consolidate by mechanical vibration. Place subsequent lifts in maximum 60 inch increments and vibrate grout for consolidation. Ensure mortar has gained sufficient strength to withstand pressure prior to grouting. "Puddling" may be used in lieu of mechanical vibration if grout lifts are limited to 12 inches maximum.
- H. High Lift Grouting:
 - 1. Provide cleanout opening no less than 4 inches high at the bottom of each cell to be grouted by cutting one face shell of masonry unit.
 - 2. Clean out masonry cells and cavities with high-pressure water spray. Permit complete water drainage. Cells and cavities may be "cleaned" by using steel rod to remove excess mortar protrusions.
 - 3. Request that Architect/Engineer inspect the cells. Allow three days advance notice.

4. After cleaning and cell inspection, seal openings with masonry units.
5. Pump grout into spaces. Maintain water content in grout to intended slump without aggregate segregation.
6. Limit grout lift to 60 inches and mechanically vibrate for grout consolidation. Wait 30 to 60 minutes before placing next lift.

3.09 CONTROL AND EXPANSION JOINTS

- A. Do not extend horizontal joint reinforcement through control and expansion joints.
- B. Form control joint with a sheet building paper bond breaker fitted to one side of the hollow contour end of the masonry unit. Fill the resultant elliptical core with grout fill. Rake joint at exposed unit faces for placement of backer rod and sealant.

3.10 BUILT-IN WORK

- A. As Work progresses, build in metal door and glazed frames, fabricated metal frames, window frames, wood nailing strips, anchor bolts, plates, and other items to be built in the Work furnished by other Sections.

3.11 POINTING AND CLEANING

- A. Point up all exposed existing brick where required, fill all holes and joints; remove loose mortar, cut out defective joints, and repoint where necessary.

3.12 TOLERANCES

- A. Maximum Variation from Plumb: 1/4 inch per story, non-cumulative.
- B. Maximum Variation from Level Coursing: 1/8 inch in 3 ft. and 1/4 inch in 10 ft.; 1/2 inch in 30 ft.

3.13 CUTTING AND FITTING

- A. Cut and fit for chases, pipes, conduit, sleeves, grounds, and other items. Coordinate with other Sections of Work to provide correct size, shape, and location.
- B. Form slots, grooves, chases, recesses, other items required for other trades. Build in all required structural steel, miscellaneous metal, sash anchors, precast concrete anchors, other items. Bed in mortar to line and level. Build in counter flashing furnished by Roofing Contractor. Check all requirements in advance to eliminate cutting.
- C. Do necessary cutting of masonry for installation of items not otherwise provided for. Patch walls, maintain structural stability, appearance, weather resistance.
- D. Cut masonry units with motor-driven saws to provide clean, sharp, unchipped edges. Cut units as required to provide continuous pattern and to fit adjoining construction. Use full-size units without cutting, where possible. Allow units cut with water-cooled saws to dry before placing, unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

3.14 REPAIRING, POINTING AND CLEANING

- A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or if units do not match adjoining units. Install new units to match adjoining units; install in fresh mortar or grout, pointed to eliminate evidence of replacement.
- B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point-up joints, including corners, opening, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for application of sealants.
- C. Remove excess mortar and mortar smears.
- D. Clean soiled surfaces with cleaning solution.

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- E. On completion of pointing and re-pointing of all face brick and block work, interior and exterior, clean thoroughly with "Sure Klean 600", "Craft Klean" or similar prepared detergent, applied strictly according to the manufacturer's instructions with stiff fiber brushes. Drench with clean water immediately after cleaning. Do not use job mixed acid on this project. All cleaning shall be done prior to installation of any finished floor, wall mounted light fixtures, aluminum frames or items subject to damage. Protect hollow metal frames, other built-in items.

3.15 MASONRY WASTE DISPOSAL

- A. Recycling: Undamaged, excess masonry materials are Contractor's property and shall be removed from the Project site for his use.

END OF SECTION

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SECTION 06100 - CARPENTRY

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

- A. Attention is directed to Division 0, Bidding and Contract Requirements, and to Division 1, General Requirements, which are hereby made a part of this Section.

1.02 DESCRIPTION OF WORK:

- A. The extent of the carpentry work is shown on the Drawings.

1.03 QUALITY ASSURANCE:

- A. Lumber Standard: Comply with U.S. Department of Commerce Product Voluntary Standards PS 1-07, "Structural Plywood", PS 2-04 Performance Standard for "Wood based structural use panels" and PS 20-05 American Softwood Lumber Standard, except as otherwise indicated.
- B. Factory mark each piece of lumber and plywood with type, grade, mill, and grading agency: West Coast Lumber Assoc. (WBLC) or Western Wood Products Association (WWPA).

1.04 SUBMITTALS:

- A. Wood Treatment Data:
 - 1. Submit treatment manufacturer's instructions for proper use of each type of treated material.
 - a. Pressure Treatment: For each type specified, include certification by treating plant stating chemicals and process used, net amount of preservative retained, and conformance with applicable standards.
 - b. For water-borne preservatives, include statement that moisture content of treated materials was reduced to a maximum of 15% prior to shipment to project site.
- B. Product Data:
 - 1. Submit manufacturer's specifications and other data for each carpentry anchorage, fastening, and miscellaneous material. Provide material certificates for all lumber and plywood. Transmit a copy of each instruction to the Installer.

1.05 PRODUCT HANDLING:

- A. Delivery and Storage: Keep materials dry during delivery and storage. Protect against exposure to weather and contact with damp or wet surfaces. Stack lumber and plywood and provide air circulation within stacks.

1.06 JOB CONDITIONS:

- A. Coordination: Fit carpentry work to other work, scribe and cope as required for accurate fit. Correlate location of furring, nailers, blocking, grounds, and similar supports to allow proper attachment of other work.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. Lumber - General:

- 1. Nominal sizes are indicated, except as shown by detail dimensions. Provide actual sizes as required by PS 20-05, for the moisture content specified for each use. Use dressed lumber, surfaced four sides (SFS) seasoned with 19% maximum moisture content at time of dressing.

B. Framing Lumber (2" through 4" thick):

- 1. For light framing (less than 6" wide), provide Construction Grade Douglas Fir as graded by the West Coast Lumber Bureau (WCLB) or equivalent species and grade with minimum fiber stress rating (bending) of 1000 psi (Fb), and modulus of elasticity of 1,500,000 psi.
- 2. For structural framing (6" and wider and from 2" to 4" thick) provide dense No. 1 Grade Douglas Fir as graded by the West Coast Lumber Bureau (WCLB) or equivalent species and grade with minimum fiber stress rating (bending) of 1500 psi (Fb), and modulus of elasticity of 1,700,000 psi.

C. Boards (less than 2" thick):

- 1. Produce lumber of 19% maximum moisture content (S-DRY) and of the following species and grade.
 - a. Redwood Construction Common (RIS).
 - b. Southern Pine No. 2 Boards (SPIB).
 - c. Or any species graded construction Boards (WCLB or WWPA).

D. Plywood:

1. Provide only Douglas Fir Plywood in accordance with grading requirements of the APA - The Engineered Wood Association as follows:
 - a. Treated non-combustible AC standard with exterior glue.

E. Anchorage and fastening Materials:

1. Select proper type, size, material, and finish for each application. Comply with the following:
 - a. Nails and Staples: FS FF-N-105.
 - b. Wood Screws: FS FF-S-111.
 - c. Bolts and Studs: FS FF-B-575.
 - d. Nuts: FS FF-N-836.
 - e. Washers: FS FF-W-92.
 - f. Lag Screws or Lag Bolts: FS FF-B-561.
 - g. Masonry Anchoring Devices: For expansion shields, nails, and drive screws, comply with FS FF-S-325.
 - h. Toggle Bolts: FS FF-B-588.
 - i. Bar or Strap Anchors: ASTM A 575 carbon steel bars.

2.02 WOOD TREATMENT:

- A. Preservation Treatment: Where lumber or plywood is indicated as "Treated" or is specified herein to be treated, comply with the applicable requirements of the American Wood Preservers Association (AWPA) AWPA P23-08, ASTM D-1625 and Federal Specification TT-W-50.
- B. Pressure-treat above-ground items with water-borne preservatives complying with AWPA P5-09, ASTM D-1760, and Federal Specification TT-W-571. After treatment, kiln-dry to a maximum moisture content of 19%. Treat indicated items and the following, except where fire retardant treated.

1. Wood cants, nailers, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers and waterproofing.
2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
3. Wood framing members less than 12 inches above grade excepting timber.

C. Fire Retardant Treated:

1. Wood blocking and similar items installed within the building shall be pressure impregnation with retardant chemicals to achieve a flame spread rating of not more than 25 when tested in accordance with UL Test 723, ASTM E 84, or NFPA Test 355.

PART 3 - EXECUTION

3.01 INSPECTION:

- A. Installer must examine the substrates and supporting structure and the conditions under which the carpentry work is to be installed and notify the General Contractor, in writing, of conditions detrimental to the work. Do not proceed with the installation until unsatisfactory conditions have been corrected in a manner acceptable to the installer.

3.02 INSTALLATION:

A. General:

1. Discard units of material with defects which might impair the quality of the work, and units which are too small to fabricate the work with minimum joints or the optimum joint arrangement.
2. Set carpentry work accurately to required levels and lines, with members plumb and true and accurately cut and fitted.
3. Securely attach carpentry work to substrate by anchoring and fastening as shown and as required. Provide washers under bolt heads and nuts in contact with wood. Nail plywood in accordance with the recommendations of APA-The Engineered Wood Association.

4. Use common wire nails, except as otherwise shown or specified herein. Use finishing nails for exposed work. Do not wax or lubricate fasteners that depend on friction for holding power. Select fasteners of size that will not penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting of wood; pre-drill as required. Do not drive threaded friction type fasteners; turn into place. Tighten bolts and lag screws at installation and retighten as required for tight connections prior to closing in or at completion of work.

B. Wood Grounds, Nailers, Blocking and Sleepers:

1. Provide wherever shown and where required for screening or attachment of other work. Form to shapes as shown and cut as required for true line and level of work to be attached. Coordinate location with other work involved.
2. Attach to substrates as required to support applied loading. Countersink bolts and nuts flush with surfaces, unless otherwise shown. Build into masonry during installation of masonry work. Where possible, anchor to form work before concrete placement.
3. Provide permanent grounds of dressed, pressure preservative treated key-bevelled lumber not less than 1-1/2" wide and of the thickness required to bring face of ground to exact thickness of finished material involved. Remove temporary grounds when no longer required.

C. Installation of Plywood:

1. Comply with recommendations of the Engineered Wood Association (APA) for the installation of plywood.

END OF SECTION 06100

SECTION 07200 - INSULATION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

- A. Attention is directed to Division 0, Bidding and Contract Requirements, and to Division 1, General Requirements, which are hereby made a part of this Section.

1.02 DESCRIPTION OF WORK:

- A. The extent of thermal insulation work is shown on the drawings.
- B. The applications of thermal insulation specified in this section include the following:
 - 1. Board-type building insulation.
 - 2. Miscellaneous insulation.
- C. Related Work Specified Elsewhere:
 - 2. Section 07840 - Firestopping: For safing insulation
 - 3. Division 23, Mechanical: Insulation for ducts, heating, air conditioning, ventilating, and plumbing work shall be furnished and installed by the respective Mechanical Contractor.
 - 4. Division 26, Electrical: Insulation for electrical work shall be furnished and installed by Electrical Contractor.

1.03 QUALITY ASSURANCE:

- A. Thermal Conductivity: The thickness shown are for the thermal conductivity (k-value at 75%) specified for each material. Provide adjusted thicknesses as directed for the equivalent use of material having a different thermal conductivity.
- B. Fire Ratings: Comply with the fire-resistance and flammability ratings indicated, and comply with governing regulations as interpreted by authorities including:
 - 1. UL requirements for "Roof Deck Constructions" which are rated "Fire-Acceptable".

1.04 SUBMITTALS:

A. Product Data:

1. Submit manufacturer's specifications and installation instructions for each type of insulation required. Include data substantiating that materials comply with specified requirements.

B. Shop Drawings:

1. Submit shop drawings for tapered roof area. Show all slopes, thickness, perimeter and roof sump conditions.

1.05 PRODUCT HANDLING:

- A. Protection from Deterioration: Do not allow insulation materials to become wet, soiled, or covered with ice or snow. Comply with manufacturer's recommendations for handling, storage and protection during installation. Protect plastic insulation from exposure to sunlight.
- B. Fire Hazard: Do not deliver plastic insulating materials to the project site ahead of installation time. Protect at all times against ignition. Complete installation and concealment of plastic materials as rapidly as possible in each area of work.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Extruded Polystyrene Plastic Board Insulation:

1. Under Slab Rigid Insulation for new cooler/freezer at Hawthorn.
 - a. Material Properties
 1. Rigid closed-cell, polystyrene thermal board insulation.
 2. Comply with ASTM C 578-95, Type X, density 1.35 lb/cu. Fet. Min., compressive strength 15 psi (ASTM D 1621-94).
 3. Thermal resistance: 5-year aged R-values of 5.0 and 5.0 min. °F-ft²-h/Btu²/inch a 40°F and 75°F respectively (ASTM C 518-91).
 4. Water absorption: Max. 0.1% by volume (ASTM C 272-91 (96)).

5. Surface Burning Characteristics (ASTM E84):
 - i. Flame Spread: 5
 - ii. Smoke Developed: 45-175
 - b. Thickness: 2" (R-10) (Provide (2) or (3) layers with offset seams) as indicated on drawings.
 - c. Acceptable manufacturer's product: Owens Corning Foamular 150 extruded polystyrene (XPS) rigid foam insulation.
-
2. Miscellaneous Insulation: Shall be inorganic (nonasbestos) mineral wool insulation without facing, for the purpose of filling and stuffing openings in walls around pipes, structural components, windows, conduits, expansion joints to eliminate noise transfer and to insulate. Use to seal top of interior walls, except fire rated walls, between masonry and roof deck, where indicated. Use at expansion joints as detailed. Insulation shall have a flame spread rating of 15 or less, and a smoke development rating of 0; per ASTM E84.

PART 3 - EXECUTION

3.01 INSPECTION:

- A. The Installer must examine the substrate and conditions under which the insulation work is to be performed, and notify the General Contractor in writing of unsatisfactory conditions. Do not proceed with the insulation work until unsatisfactory conditions have been corrected in a manner acceptable to the Installer.

3.02 INSULATION:

A. General:

1. Comply with manufacturer's instructions for the particular conditions of installation in each case. If printed instructions are not available or do not apply to the project conditions, consult the manufacturer's technical representative for specific recommendations before proceeding with the work.
2. Extend insulation full thickness as shown over entire area to be insulated. Cut and fit tightly around obstructions, and fill voids with insulation. Remove projections which interfere with placement.

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3. Apply a single layer of insulation of the required thickness unless otherwise shown or required to make up the total thickness.

B. General Building Insulation:

1. Apply insulation units to the substrate by the method indicated, complying with the manufacturer's recommendations. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage, to provide permanent placement and support of units.
2. Stuff loose mineral fiber insulation into miscellaneous voids and cavity spaces as indicated. Compact to approximately 40% of normal maximum volume (to a density of approximately 2.5 lbs. per cu. ft.).

END OF SECTION 07200

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SECTION 07840 - FIRESTOPPING

PART I - GENERAL

1.01 RELATED DOCUMENTS:

- A. Attention is directed to Division 0, Bidding and Contract Requirements, and to Division 1, General Requirements, which are hereby made a part of this section.

1.02 DESCRIPTION OF WORK:

- A. Provide labor and materials necessary for complete installation of firestopping materials and systems. Section includes firestopping for the following:
 - 1. Penetrations through fire resistance rated floor and roof construction including both empty openings and openings containing cables, pipes, ducts, conduits, and other penetrating items.
 - 2. Penetrations through fire resistance rated walls and partitions including both empty openings and openings containing cables, pipes, ducts, conduits and other penetrating items.
 - 3. Penetrations through smoke barriers and construction enclosing compartmentalized area involving both empty openings and openings containing penetrating items.
 - 4. Sealant joints in fire resistance rated construction.

1.03 SUBMITTALS:

- A. Product Data: Manufacturer's specifications and technical data for each material including the composition and limitations, documentation of UL or other nationally recognized independent testing laboratories firestop systems to be used and manufacturer's installation instructions.
 - 1. Submit material safety data sheets (MSDS) provided with product delivered to jobsite.

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- B. Product certificates signed by manufacturers of firestopping products certifying that their products and installation comply with specified requirements. Certification shall be signed by the Installer.

1.04 QUALITY ASSURANCE:

- A. Conform to applicable governing codes, including local governing authorities, but not limited to the following:
 - 1. NFPA 101 1997 edition and current edition
 - 2. 2015 & 2021 Michigan Building Code
- B. Meet requirements of ASTM E814 or UL 1479 tested assemblies that provide a fire rating equal to that of construction being penetrated and other ASTM Standards as applicable for the installation.
 - 1. ASTM E84 "Test Method for Surface Burning Characteristics of Building Materials".
 - 2. ASTM E119 "Test Methods for Fire Tests of Building Construction and Materials".

PARTS 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with through-penetration firestop systems (XHEZ) listed in Volume II of the UL Fire Resistance Directory, provide products by one of the following:
 - 1. Hilti Construction Chemicals, Tulsa, OK
 - 2. Specified Technologies Inc. (STI) Sommerville, NJ
 - 3. 3M Fire Protection Products, St. Paul, MN
 - 4. The Rectorseal Corp., Houston, TX
 - 5. Tremco, Inc. Beachwood, OH

2.02 FIRESTOPPING, GENERAL

- A. Compatibility: Provide firestopping composed of components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the firestopping under conditions of service and application, as demonstrated by firestopping manufacturer based on testing and field experience.

1. All materials shall comply with ASTM E814 or E119 (UL 1429) and shall be manufactured of non-toxic, non-hazardous, asbestos free materials, and unaffected by water or moisture when cured.
 2. Primers: Conform to manufacturer's recommendations for primers required for various substrate and conditions.
 3. Backup materials: Backup materials, supports, and anchoring devices shall be provided as required by UL testing.
- B. Accessories: Provide components for each firestopping system that are needed to install fill materials and to comply with "System Performance Requirements" in Part 1. Use only components specified by the firestopping manufacturer and approved by the qualified testing and inspecting agency for the designated fire resistance rated system. Accessories include but are not limited to the following items:
1. Permanent forming/damming/backing materials must be noncombustible and may include the following:
 - a. Semirefractory fiber (mineral wool) insulation.
 - b. Sealants used in combination with other forming/damming materials to prevent leakage of fill materials in liquid state.
 - c. Joint fillers for joint sealants.
 2. Temporary forming materials.
 3. Substrate primers.
 4. Collars.
 5. Steel sleeves.

2.03 FIRE STOPPING, MATERIALS

- A. Use only firestopping products that have been UL 1479 or ASTM E814 tested for specific fire rated construction conditions conforming to construction assembly type, penetrating item type, annular space requirements, and fire rating involved for each separate instance.
- B. For penetrations by noncombustible items including steel pipe, copper pipe, rigid steel conduit, and electrical metallic tubing (EMT), the following materials are acceptable:

1. Hilti FAS 601 Elastomeric Firestop Sealant
 2. STI SpecSeal Sealant SSS 100
 3. 3M Fire Barrier CP25
 4. The RectorSeal Corp. Metacaulk 1000, 950, 835, Putty, & Mortar.
 5. Fyre-Sil, Tremco, Inc.
 6. Biofireshield K10 and K2 Mortar, Biostop 500+, Biootherm 100/22200 & Biostop Putty, The RectorSeal Corp.
- C. For penetrations by combustible items (penetrants consumed by high heat and flame) including insulated metal pipe, PVC jacketed, flexible cable or cable bundles and plastic pipe (closed piping systems) the following materials are acceptable:
1. STI Wrap Strip SSW12
 2. Hilti FS One Intumescent Firestop Sealant
 3. 3M Fire Barrier FS-195 Wrap Strip
 4. Metacaulk Wrap Strip, Firestop Collars, Metacaulk 1000, 950 & 835.
 5. Biostop Wrap Strip, Collar, and Biostop 500+.
- D. For large size/complex penetrations made to accommodate cable trays, multiple steel and copper pipes, electrical busways in raceways, the following materials are acceptable:
1. STI SpecSeal lightweight mortar SSM22B or putty
 2. Hilti FS635 Trowelable Firestop Compound
 3. 3M Fire Barrier FS-195 Composite Sheet
 4. Biofireshield K-10 & K2 mortar
 5. Metacaulk Firestop Mortar
- E. For fire-rated construction joints and other gaps with movement, the following materials are acceptable:
1. Hilti FS 601 Elastomeric Firestop Sealant
 2. STI Pensil 300
 3. 3M (Dow Corning Fire Stop Sealant 2000)
 4. Fyre-Sil, Tremco, Inc.
 5. Biofireshield, Biostop 700, Biostop 500+
 6. Metacaulk 1000 & 1100
- F. Provide a firestopping system with an "F" rating as determined by UL 1479 or ASTM E814 which is equal to the time rating of construction being penetrated.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of firestopping. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Surface Cleaning: Clean out openings and joints immediately prior to installing firestopping to comply with recommendations of firestopping manufacturer and the following requirements:
 - 1. Remove all foreign materials from surfaces of opening and joint substrates and from penetrating items that could interfere with adhesion of firestopping.
 - 2. Clean opening and joint substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with firestopping. Remove loose particles remaining from cleaning operation.
 - 3. Remove laitance and form release agent from concrete.

3.03 INSTALLING THROUGH-PENETRATION FIRESTOPS

- A. General: Comply with the manufacturer's installation instructions and drawings pertaining to products and applications indicated.
- B. Install forming/damming materials and other accessories of types required to support fill materials during their application and in the position needed to produce the cross sectional shapes and depths required to achieve fire ratings of designate through-penetration firestop systems. After installing fill materials, remove combustible forming materials and other accessories not indicated as permanent components of firestop systems.
- C. Install fill materials for through-penetration firestop systems by proven techniques to produce the following results:

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1. Completely fill voids and cavities formed by openings, forming materials, accessories, and penetrating items.
2. Apply materials so they contact and adhere to substrate formed by openings and penetrating items.
3. For fill materials that will remain exposed after completing work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.04 INSTALLING FIRE RESISTIVE JOINT SEALANTS

- A. General: Comply with the manufacturer's installation instructions and drawings pertaining to products and application indicated.

3.05 CLEANING

- A. Clean off excess fill materials and sealant adjacent to openings and joints as work progresses by methods and with cleaning materials approved by manufacturers of firestopping products and of products in which opening and joints occur.

END OF SECTION 07840

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SECTION 07910 - JOINT FILLERS AND GASKETS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

- A. Attention is directed to Division 0, Bidding and Contract Requirements, and to Division 1, General Requirements, which are hereby made a part of this Section.

1.02 DESCRIPTION OF WORK:

- A. The extent of each type of joint filler and gasket work is indicated on the drawings and by provisions of this section, and is hereby defined to include required fillers and gaskets not specified in other sections of these specifications.
- B. The required applications of joint fillers and gaskets include, but are not necessarily limited to, the following general types and locations:
 - 1. Isolation and expansion joint fillers in structural concrete.
 - 2. Floor construction/expansion joint fillers.
 - 3. Joint fillers around penetrations of equipment and services through walls, floors and roofs.

1.03 SUBMITTALS:

- A. Product Data:
 - 1. Submit manufacturer's specifications, installation instructions and recommendations for each type of material required.
- B. Samples:
 - 1. Submit (3) three, 12 inches long samples of each joint filler or gasket.

PART 2 - PRODUCTS

2.01 MATERIALS, GENERAL:

- A. Size and Shape: Provide sizes and shapes of units as shown or, if not shown, as recommended by manufacturer for joint size and condition shown. Where joint movement is a factor in a determination of size, consult with Architect to determine nature and magnitude of anticipated joint movements for the temperature and condition of project at time of installation.
- B. Compressibility: Specified hardness and compressibilities are intended to establish requirements for normal or average conditions of installation and use. Where a range of hardness or compressibility is available for a product, comply with manufacturer's recommendations for specific condition of use.
- C. Color: Provide each concealed material in manufacturer's standard color which has best overall performance characteristics for application shown. Provide exposed materials in black, except where another color is indicated.
- D. Compatibility: Before purchase of each filler or gasket material, confirm that it is compatible with substrate, sealants and other materials in joint system.
- E. Adhesives: Pressure sensitive adhesives, compatible with each material in joint system may be applied (at installer's option) to one face of joint fillers and gaskets to facilitate installation and permanent anchorage. Do not allow adhesives to contaminate sealant bond surface (if any) in joint system.

2.02 CONCRETE CONTROL/EXPANSION JOINT FILLERS:

- A. Bituminous and Fiber Joint Filler:
 - 1. Provide resilient and non-extruding type premolded bituminous impregnated fiberboard units complying with ASTM D 1751, FS HH-F-341, Type 1 and AASHO M 213.

2. Provide one of the following products:
 - a. Flexcell-Knight-Celotex Corporation
 - b. Expansion-Joint Filler; BASF/Sonneborn
 - c. FF-14. Asphalt Fiber-Board; Progress Unlimited
 - d. Fibre Expansion Joint; W.R. Meadows, Inc.
 - e. Conflex Fiber Expansion Control Joint Filler, JD Russell

2.03 CELLULAR/FOAM EXPANSION JOINT FILLERS:

A. Closed-Cell PVC Joint Filler:

1. Provide flexible expanded polyvinyl chloride complying with ASTM D 1667. Grade VE 41 BL (3.0 psi compression deflection); except provide higher compression deflection grades as may be necessary to withstand installation forces.
2. Provide one of the following products:
 - a. FF2 PVC: Progress Unlimited, Inc.
 - b. Vinyl "U" 1000 Series: Williams Products, Inc.

2.04 GASKETS:

A. Molded Neoprene Gasket:

1. Provide extruded neoprene or EPDM gaskets complying with ASTM D 2000, Designation 2BC 415 to 3BC 620, black (40 to 60 Shore A durometer hardness); of the profile shown or, if not shown, as required by the joint shape, size and movement characteristics to maintain a watertight and airtight seal.
2. Provide products by one of the following manufacturers:
 - a. D.S. Brown Company
 - b. Hohmann & Barnard, Inc.
 - c. Kirkhill Rubber Company
 - d. Progress Unlimited, Inc.
 - e. JD Russell
 - f. Williams Products, Inc.

2.05 MISCELLANEOUS MATERIALS:

A. Oakum Joint Filler:

1. Provide untreated hemp or jute fiber rope, free of oil, tar and other compounds which might stain surfaces, contaminate joint walls or not be compatible with sealants.

B. Fire-Resistant Joint Filler:

1. Glass fiber or other inorganic non-combustible fiber formed with minimum of binder into resilient joint filler strips or blankets of sizes and shapes indicated, recommended by manufacturer specifically for increasing fire resistance or endurance of joint systems of type indicated, for service temperatures up to 2300 degrees F, 80% (min.) recovery 50% compression.

PART 3 - EXECUTION

3.01 INSPECTION:

- A. Installer must examine joint surfaces of units to receive fillers or gaskets and conditions under which the work is to be performed and notify the General Contractor, in writing, of conditions detrimental to proper completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to Installer.

3.02 INSTALLATION:

- A. Comply with manufacturer's instructions and recommendations for installation of each type of joint filler or gasket required, unless more stringent requirements are shown or specified.
- B. Set units at proper depth of position in joint to coordinate with other work, including installation of bond breakers, backer rods, and sealants. Do not leave voids or gaps between ends of joint filler units.
- C. Recess exposed edges or faces of gaskets and exposed joint filler slightly behind adjoining surfaces, unless otherwise shown, so that compressed units will not protrude from joints.

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- D. Bond ends of gaskets together with adhesive or by means as recommended by manufacturer to ensure continuous watertight and airtight performance. Miter-cut and bond ends at corners except where molded corner units are provided.

END OF SECTION 07910

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SECTION 07920 - SEALANTS AND CAULKING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

- A. Attention is directed to Division 0, Bidding and Contract Requirements, and to Division 1, General Requirements, which are hereby made a part of this Section.

1.02 DESCRIPTION OF WORK:

- A. The extent of each type of sealant and caulking work is indicated on the drawings, and by provisions of this section.
- B. The required applications of sealants and caulking include, but are not necessarily limited to, the following general locations:
 - 1. Masonry control joints, interior.
 - 2. Interior sound-sealed and air-sealed joints.
 - 3. Flooring joints.
 - 4. Isolation joints, between structure and other elements.
 - 5. Joints at penetrations of walls, decks and floors by piping and other services and equipment.
 - 6. Joints between items of equipment and other construction.
 - 7. Joints between dissimilar materials.

1.03 QUALITY ASSURANCE:

- A. Manufacturers: Firms with not less than 5 years of successful experience in production of types of sealants and caulking compounds required for this project.
 - 1. Obtain elastomeric sealants from a manufacturer which will, upon request, send a qualified technical representative to the project site for purpose of advising installer on proper procedures for use of products.
- B. Installer: A firm with a minimum of (5) five years of successful experience in application of types of materials required.

1.04 SUBMITTALS:

A. Product Data:

1. Submit manufacturer's specifications, recommendations and installation and instructions for each type of sealant, caulking compound and associated miscellaneous material required.

B. Samples:

1. Submit (3) three, 12" long samples of each color required (except black) for each type of sealant and caulking compound exposed to view. Install sample between two strips of material similar to or representative of typical surfaces where compound will be used, held apart to represent typical joint widths.

1.05 JOB CONDITIONS:

- A. Pre-Installation Meeting: At the Construction Manager's direction, installer, sealant manufacturer's technical representative, and other trades involved in coordination with sealant work shall meet with General Contractor at project site to review procedures and time schedule proposed for installation of sealants in coordination with other work. Review each major sealant application required on project.
- B. Weather Conditions: Do not proceed with installation of sealants under adverse weather conditions, or when temperatures are below or above manufacturer's recommended temperature range for installation. Proceed with the work only when forecasted weather conditions are favorable for proper cure and development of high early bond strength. Where joint width is affected by ambient temperature variations, install elastomeric sealants only when temperatures are in lower third of the manufacturer's recommended installation temperature range, so that sealant will not be subjected to excessive elongation and bond stress at subsequent low temperatures. Coordinate time schedule with the Construction Manager to avoid delay of project.

- C. Statement of Non-Compliance: Where it is necessary to proceed with installation of sealants or caulking compound under conditions which do not fully comply with requirements (because of time schedule or other reasons which the Construction Manager determines to be crucial to project), prepare written statement for Owner's record (with copy to Architect) indicating the nature of non-compliance, reasons for proceeding, precautionary measures taken to ensure best possible work, and names of individuals concurring with decision to proceed with installation.

1.06 SPECIAL PROJECT WARRANTY (GUARANTEE):

- A. Sealant Warranty: Provide written warranty, signed by contractor and installer, agreeing to, within warranty period of (10) ten years after date of substantial completion, replace/repair defective materials and workmanship defined to include: Instances of significant leakage of water or air; failures in joint adhesion, material cohesion, abrasion resistance, strain resistance or general durability; failure to perform as required, and the general appearance of deterioration in any other manner not clearly specified in manufacturer's published product literature as an inherent characteristic of the sealant material. Warranty includes responsibility for removal and replacement of other work (if any) which conceals or obstructs the replacement of sealants.

PART 2 - PRODUCTS

2.01 MATERIALS, GENERAL:

- A. Colors: Provide black or other natural color where no other standard or custom color is available. Where material is not exposed to view, provide manufacturer's standard color which has best overall performance characteristics for application shown.
1. Provide manufacturer's standard colors as selected by Architect from manufacturer's standard colors.

- B. Hardnesses shown and specified are intended to indicate general range necessary for overall performance. Consult manufacturer's technical representative to determine actual hardness recommended for conditions of installation and use. Upon request, Architect will furnish information concerning anticipated joint movement related to actual joint width and installation temperature. Except as otherwise indicated or recommended, provide compounds within the following range of hardness (Shore A, fully cured, at 75 degrees F.).
1. 5 to 20 for high percentage of movement and minimum exposure to weather and abrasion (including no exposure to vandalism).
 2. 15 to 35 for moderate percentage of movement and moderate exposure to weather and abrasion.
 3. 30 to 60 for low percentage of movement and maximum exposure to weather and abrasion (including foot traffic on horizontal joints).
- C. Modulus of Elasticity: For joints subjected to movement, either thermal expansion or dynamic movement, select sealants from among available variations which have lowest modulus of elasticity which is consistent with exposure to abrasion or vandalism. For horizontal joints subject to traffic, select sealants with high modulus of elasticity as required to withstand indentation by stiletto heels. Comply with manufacturer's recommendations where no other requirements are indicated.
- D. Compatibility: Before selection and purchase of each specified sealant, investigate its compatibility with joint surfaces, joint fillers and other materials in joint system. Provide only materials (manufacturer's recommended variation of specified materials) which are known to be fully compatible with actual installation conditions as shown by manufacturer's published data or certification.

2.02 SEALANTS:

- A. One Part Elastomeric Sealant (Silicone)
 - 1. One component elastomeric sealant, complying with ASTM C 920, Class 50, Type NS (nonsag), unless Type S (self-leveling) recommended by manufacturer for the application shown.
 - a. Acceptable Standard
 - 1. "Pecora 864 Architectural Silicone Sealant; Pecora Corp. Class 50
 - 2. Dow Corning Dowsil 791; Dow Corning Corp.
 - 3. Silpruf; General Electric Class 25 or 50 depending on model number
 - 4. Masterseal Np 100; BASF Corp, Building Systems Inc.
 - 5. Spectrem 2; Tremco Mfg. Co.
 - 6. Sikasil WS295; Sika Corp.
 - 2. One-Component mildew resistant silicone sealant: (Around countertops and backsplashes and other wet interior locations).
 - a. Acceptable Standard
 - 1. Rhodorsil 6B white; Rhone-Poulenc Inc.
 - 2. Dow Corning Dowsil 786; Dow Corning Corp.
 - 3. Sanitary 1700; General Electric
 - 3. One Component high movement joints (+100/-50): Where locations of high movement are indicated.
 - a. Dow Corning Dowsil 790; Dow Corning Corp.,
 - b. Spectrem 1; Tremco
- B. Elastomeric Sealant (Polyurethane)
 - 1. One component polyurethane sealant, complying with ASTM C 920, Type S, Grade NS, Class 25 (nonsag).
 - a. Acceptable Standard
 - 1. Masterseal NP 1; BASF Corp. Bldg. Systems
 - 2. Dymonic; Tremco Mfg. Co.
 - 3. Dynatrol I; Pecora Corp.
 - 4. Vulkem 921; Mameco
 - 5. CS 2130; Hilti
 - 6. Sikaflex 1A; Sika Corp.
 - 7. Sikaflex 15LM; Sika Corp.

2. Two Component polyurethane sealant, complying with ASTM C 920, Type M, Grade NS, Class 25 (nonsag).
 - a. Acceptable Standard
 1. Masterseal NP 2; BASF Corp. Bldg. Systems
 2. Dymeric; Tremco Mfg. Co.
 3. Dynatrol II; Pecora Corp.
 4. Vulkem 922; Mameco
 5. Sikaflex 2cNSEZ; Sika Corp.
- C. Security Sealant (Polyurethane)
 1. One component or two component polyurethane sealant, complying with ASTM C 920, Grade NS, Class 12.5, with a Shore A Hardness of 55.
 - a. Acceptable Standard
 1. Dynaflex; Pecora Corp.
 2. Masterseal CR 195; BASF Corp. BLDG Systems

2.04 CAULKING COMPOUNDS:

- A. Caulking Compounds: (Acrylic Latex Sealant)
 1. Latex rubber modified, acrylic emulsion polymer sealant compound; manufacturer's standard, one part, nonsag, mildew resistant, acrylic emulsion sealant complying with ASTM C 834, formulated to be paintable and recommended for exposed applications on interior locations involving joint movement of not more than plus or minus 5 percent.
 2. Acceptable Standard
 - a. Masterseal NP 520, BASF Corp. Bldg. Systems
 - b. Acrylic Latex Caulk 834, Tremco Inc.
 - c. Acrylic Latex Caulk with Silicone, DAP
 - d. AC-20, Pecora Corp.

2.05 MISCELLANEOUS MATERIALS:

- A. Joint Cleaner: Provide type of joint cleaning compound recommended by sealant or caulking compound manufacturer, for joint surfaces to be cleaned.
- B. Joint Primer/Sealer: Provide type of joint primer/sealer recommended by sealant manufacturer, for joint surfaces to be primed or sealed.

- C. Bond Breaker Tape: Polyethylene tape or other plastic tape as recommended by sealant manufacturer, to be applied to sealant-contact surfaces where bond to substrate or joint filler must be avoided for proper performance of sealant. Provide self-adhesive tape where applicable.
- D. Sealant Backer Rod: Compressible rod stock polyethylene foam, polyethylene jacketed polyurethane foam butyl rubber foam, neoprene foam or other flexible, permanent, durable non-absorptive material as recommended for compatibility with sealant by the sealant manufacturer.
- E. Provide size and shape of rod which will control joint depth for sealant placement, break bond of sealant at bottom of joint, form optimum shape of sealant bead on back side, and provide a highly compressible backer to minimize possibility of sealant extrusion when joint is compressed.

PART 3 - EXECUTION

3.01 EXAMINATION:

- A. The installer must examine joint surfaces, backing and anchorage of units forming sealant rabbet and condition under which sealant work is to be performed and notify the General Contractor in writing of conditions detrimental to proper completion of the work and performance by sealants. Do not proceed with sealant work until unsatisfactory conditions have been corrected in a manner acceptable to Installer.

3.02 SELECTION OF MATERIAL

- A. Caulking compounds shall be used for interior nonmoving joints and at locations indicated.
- B. One component elastomeric silicone sealants shall be used at exterior and interior joints where thermal or dynamic movement is anticipated including, but not limited to, the following locations:
 - 1. Metal to metal joints.
 - 2. Sheet metal flashing, coping, preformed metal caps, fascias, extenders, trim, and panels.

- C. One or two component elastomeric polyurethane sealants shall be used at exterior and interior joints where weatherproofing or waterproofing is required and at exterior joints between dissimilar materials including, but not limited to, the following locations:
1. Expansion and control joints.
 2. Lintels and shelf angles to masonry construction.
 3. Vertical interior expansion joints and horizontal interior control joints and expansion joints in the building.
 4. Sealant in pipe sleeves where materials must perforate the floor slab.
 5. Perimeter of floor slabs which abut vertical surfaces.
 6. Exterior joints between dissimilar materials where the joining of the two surfaces leaves a gap between the meeting materials or components as may be dictated by the various methods of construction to make watertight.
 7. Exterior locations which are noted "caulked" or "sealant" and not specifically listed herein or included in the work of other sections of the Specifications.
 8. Interior joints between dissimilar materials where the joining of the two surfaces leave a gap between the meeting materials and components.
- D. Security sealant shall be used in vertical control joints in the interior side of building.

3.03 JOINT SURFACE PREPARATION:

- A. Clean joint surfaces immediately before installation of sealant or caulking compound. Remove dirt, insecure coatings, moisture and other substances which would interfere with bond of sealant or caulking compound.
- B. For elastomeric sealants, do not proceed with installation of sealant over joint surfaces which have been painted, lacquered, waterproofed or treated with water repellent or other treatment or coating unless a laboratory test for durability (adhesion), in compliance with paragraph 4.3.9. of FS TT-S-00227 has successfully demonstrated that sealant bond is not impaired by coating or treatment. If laboratory test has not been performed or shows bond interference, remove coating or treatment from joint surfaces before installing sealant.

- C. Etch concrete and masonry joint surfaces to remove excess alkalinity, unless sealant manufacturer's printed instructions indicate that alkalinity does not interfere with sealant bond and performance. Etch with 5% solution of muriatic acid; neutralize with dilute ammonia solution, rinse thoroughly with water and allow to dry before sealant installation.
- D. Roughen joint surfaces on vitreous coated and similar non-porous materials, where sealant manufacturer's data indicated lower bond strength than for porous surfaces. Rub with fine abrasive to produce a dull sheen.

3.04 INSTALLATION:

- A. Comply with sealant manufacturer's printed instructions except where more stringent requirements are shown or specified and except where manufacturer's technical representative directs otherwise.
- B. Prime or seal joint surfaces where shown or recommended by sealant manufacturer. Do not allow primer/sealer to spill or migrate onto adjoining surfaces.
- C. Install sealant backer rod for liquid sealants, except where shown to be omitted or recommended to be omitted by sealant manufacturer for the application shown.
- D. Install bond breaker tape where shown and where required by manufacturer's recommendations to ensure that elastomeric sealants will perform properly.
- E. Employ only proven installation techniques, which will ensure that sealants will be deposited in uniform, continuous ribbons without gaps or air pockets, with complete "wetting" of joint bond surfaces equally on opposite sides. Except as otherwise indicated, fill sealant rabbet to a slightly concave surface, slightly below adjoining surfaces. Where horizontal joints are between a horizontal surface and a vertical surface, fill joint to form a slight cove, so that joint will not trap moisture and dirt.
- F. Install sealants to depths as shown or if not shown as recommended by sealant manufacturer but within the following general limitations, measured at center (thin) section of bead.

1. For normal moving joints sealed with elastomeric sealants, fill joints to a depth equal to 50% of joint width, but neither more than 1/2" deep nor less than 1/4" deep.
 2. For joints sealed with non-elastomeric sealants and caulking compounds, fill joints to a depth in the range of 75% to 125% of joint width.
- G. Spillage: Do not allow sealants or compounds to overflow or spill onto adjoining surfaces or to migrate into voids of adjoining surfaces including exposed aggregate panels and similar rough textures. Use masking tape or other precautionary devices to prevent staining of adjoining surfaces but either primer/sealer or the sealant/caulking compound.
- H. Remove excess and spillage of compounds promptly as the work progresses. Clean adjoining surfaces by whatever means may be necessary to eliminate evidence of spillage without damage to adjoining surfaces or finishes.

3.05 CURE AND PROTECTION:

- A. Cure sealants and caulking compounds in compliance with manufacturer's instructions and recommendations to obtain high early bond strength, internal cohesive strength and surface durability. Do not cure in a manner which would significantly alter materials modulus of elasticity or other characteristics.
- B. Installer shall advise the General Contractor of procedures required for curing and protection of sealants and caulking compounds during construction period, so that they will be without deterioration or damage (other than normal wear and weathering) at time of Owner's acceptance.

END OF SECTION 07920

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SECTION 08330 - ROLLING GRILLES

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Manual overhead rolling grilles.
- B. Related Sections:
 - 1. 04300 Masonry- Door opening jamb members.
 - 2. 05500 Metal Fabrications. Door opening head members.

1.2 SYSTEM DESCRIPTION

- A. Design Requirements:
 - 1. Cycle Life:
 - a. Design grilles of standard construction for normal use of up to 5 cycles per day maximum.

1.3 SUBMITTALS

- A. Reference Section 01340 "Shop Drawings, Product Data and Samples" for Submittal Procedures; submit the following items:
 - 1. Product Data.
 - 2. Shop Drawings: Include special conditions not detailed in Product Data. Show interface with adjacent work.
 - 3. Quality Assurance/Control Submittals:
 - a. Provide proof of manufacturer ISO 9001:2008 registration.
 - b. Provide proof of manufacturer and installer qualifications - see 1.4 below.
 - c. Provide manufacturer's installation instructions.
 - 4. Closeout Submittals:
 - a. Operation and Maintenance Manual.
 - b. Certificate stating that installed materials comply with this specification.

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1.4 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturer Qualifications: ISO 9001:2008 registered and a minimum of five years experience in producing grilles of the type specified.
2. Installer Qualifications: Manufacturer's approval.

1.5 DELIVERY STORAGE AND HANDLING

- A. Reference Division 1 for Product Storage and Handling Requirements.
- B. Follow manufacturer's instructions.

1.6 WARRANTY

- A. Standard Warranty: (2) Two years from date of shipment against defects in material and workmanship.
- B. Maintenance: Submit for owner's consideration and acceptance of a maintenance service agreement for installed products.

PART 2 PRODUCTS

2.1 MANUFACTURER

- A. Manufacturer: Cornell Iron Works, Inc., Crestwood Industrial Park, Mountaintop, PA 18707. Telephone: (800) 233-8366, Fax: (800) 526-0841. Underwriters Laboratories, Inc. (UL), ISO 9001:2008 Registered.

1. Model: ESG10

B. Approved Equals:

1. The Cookson Company, Inc., Phoenix, AZ 85043, 800-390-8590
2. Amarr
3. Cloplay

2.2 MATERIALS

A. Curtain:

1. ESG10 Straight Pattern
 - a. Horizontal Rods: Solid 5/16 inch (8 mm) diameter, AISI 300 series stainless steel.
 1. Vertical Spacing: 2 inches (50.8 mm) on center.
 - b. Vertical Chains: Grommetted stainless steel links, 3/4 inch (19 mm) wide, positioned by E-rings on 6 inch (152.4 mm) centers. Provide double E-rings on horizontal bars on both sides of end chains to retain curtain in guides.
2. Bottom Bar: 2 x 3-1/2 inch (50.8 x 88.9 mm) stainless steel.
3. Finish:
 - a. Stainless Steel Curtain with Stainless Steel Bottom Bar: Factory polished.

- ### B. Guides, Wall Mounted: Stainless steel angles sections with snap-on cover to conceal fasteners and polypropylene pile runners on both sides of curtain. Provide stainless steel angles as required for face of wall installation.
1. Finish: Type 304 #4 brushed finish.

C. Counterbalance Shaft Assembly:

1. Barrel: Steel pipe capable of supporting curtain load with maximum deflection of 0.03 inches per foot (2.5 mm per meter) of width.
2. Spring Balance: Oil-tempered, heat-treated steel helical torsion spring assembly designed for proper balance of grille to ensure that maximum effort to operate will not exceed 25 lbs (110 N). Provide wheel for applying and adjusting spring torque.

- ### D. Brackets: Fabricate from minimum 3/16 inch (4.76 mm) steel plate with permanently lubricated ball or roller bearings at rotating support points to support counterbalance shaft assembly and form end closures.

1. Finish: Phosphate treatment followed by a light gray baked-on polyester powder coat; minimum 2.5 mils (0.065 mm) cured film thickness.

E. Hood: 24 gauge stainless steel with reinforced top and bottom edges. Provide $\frac{1}{4}$ inch intermediate support brackets as required to prevent excessive sag. Finish: Stainless steel No. 4 finish.

2.3 ACCESSORIES

A. Locking:

1. Manual Push-Up: Keyed cylinder locking into both jambs operable from both sides of curtain.

2.4 OPERATION

A. Manual Push-Up: Provide pole with hook. Suitable for model ESG10 aluminum grilles up to 16' (4.88 M) wide and up to 10' (3.05 M) high.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates upon which work will be installed and verify conditions are in accordance with approved shop drawings.

B. Coordinate with responsible entity to perform corrective work on unsatisfactory substrates.

C. Commencement of work by installer is acceptance of substrate.

3.2 INSTALLATION

A. General: Install grille and operating equipment with necessary hardware, anchors, inserts, hangers and supports.

B. Follow manufacturer's installation instructions.

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3.3 ADJUSTING

- A. Following completion of installation, including related work by others, lubricate, test, and adjust grilles for ease of operation, free from warp, twist, or distortion.

3.4 CLEANING

- A. Clean surfaces soiled by work as recommended by manufacturer.
- B. Remove surplus materials and debris from the site.

3.5 DEMONSTRATION

- A. Demonstrate proper operation to Owner's Representative.
- B. Instruct Owner's Representative in maintenance procedures.

END OF SECTION

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SECTION 09280 - CEMENT BOARD

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Cement board and accessories.

B. Related Sections:

1. Section 09300 - Tile Work

1.02 REFERENCES

A. American National Standards Institute (ANSI):

1. A108.11, American National Standard for Interior Installation of Cementitious Backer Units.
2. A118.4, American National Standard Specifications for Latex-Portland Cement Mortar.
3. A118.9, Test Methods and Specifications for Cementitious Backer Units.

B. American Society for Testing and Materials (ASTM):

1. C 473, Test Methods for Physical Testing of Gypsum Panel Products.
2. C 1325, Specification for Fiber-Mat Reinforced Non-Asbestos Cement Interior Substrate Sheets.
3. C 1002, Specification for Steel Drill screws for the Application of Gypsum Panel Products or Metal Plaster Bases.

1.03 SUBMITTALS

- A. Product Data: Manufacturers' specifications and installation instructions for each product specified.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Packaging and Shipping: Have materials shipped in manufacturer's original packages showing manufacturer's name and product brand name.
- B. Storage and Protection: Store materials inside and protected from damage by the elements. Protect ends, edges, and faces of cement boards from damage.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- 1. Cement Board:
 - a. Tile Backer: PermaBASE[®] Cement Board.
 - 1. National Gypsum Board
 - 2. United States Gypsum - USG Durock w/Edgeguard
 - 3. Certainteed-GlasRoc Tile Backer
 - 4. Georgia Pacific - DenShield Tile Backer

2.02 MATERIALS

- A. Cement Board:
 - 1. Backer Board: Cementitious, water durable, board; surfaced with fiberglass reinforcing mesh on front and back; long edges wrapped; and complying with ANSI A118.9 and ASTM C 1325
 - a. Thickness: 5/8 in.
 - b. Width: 4 ft.
 - c. Length: 8 ft.
 - d. Edges: Tapered.
 - e. Compressive Strength: Not less than 2250 lbs. per sq. in. when tested in accordance with ASTM D 2394.
 - f. Water Absorption: Not greater than 8 percent when tested for 24 hours in accordance with ASTM C 473.
 - 2. Fasteners:
 - a. Screws: Drill point screws (No. 8) wafer head, corrosion-resistant, 1-1/4 in. or 1-5/8 in. long, and complying with ASTM C 1002.

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3. Joint Treatment:
 - a. Tape: Alkali-resistant fiberglass mesh tape intended for use with cement board.
4. Bonding Materials:
 - a. Mortar: Latex-portland cement mortar in accordance with ANSI A118.4.

PART 3 EXECUTION

3.01 INSTALLATION

- A. General: In accordance with the following reference standards and manufacturer's recommendations: ANSI A108.11.
- B. Install on steel rigid furring channels:
 1. ASTM C645 hat-shaped depth and min. thickness of base (uncoated) metal as follows:
 - a. Depth - 1-1/2" (20 gauge-33 mil)
 - b. Thickness: 0.0329" unless otherwise indicated
 - c. Manufacturer:
 1. Clark Dietrich Framing
 2. Jaimes Industries Inc.
 3. Marino/Ware- Division of Ware Industries

END OF SECTION 09280

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SECTION 09300 - TILE WORK

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Attention is directed to Division 0, Bidding and Contract Requirements, and to Division 1, General Requirements, which are hereby made a part of this Section.

1.02 DESCRIPTION OF WORK:

- A. The extent of tile work is shown on drawings and in schedules.
- B. Finishing and edge-protection profiles for walls and corners.

1.03 QUALITY ASSURANCE:

- A. Qualifications of Installers:
 - 1. For installation of porcelain ceramic tile and quarry tile, use only thoroughly trained and experienced personnel completely familiar with specified products, manufacturer's recommended methods of installation and requirements established for this work.
- B. Codes and Standards:
 - 1. Comply with recommendations of the latest edition of "Handbook for Ceramic Tile Installation" published by Tile Council of America.
 - 2. Comply with ANSI and ASTM Standards listed within this Section.
- C. Proprietary Materials: Handle, store, mix and apply proprietary setting and grouting materials in compliance with manufacturer's instructions.

1.04 SUBMITTALS:

- A. Product Data:
 - 1. For information only, submit PDF copy of manufacturer's technical information and install instructions for all materials required, except bulk materials. Include certifications and other data as may be required to show compliance with these specifications. Transmit a copy of each instruction to the Installer.

2. Accompany materials list with PDF copy of manufacturer's current recommended method of installation for each item. These recommendations, after review by Contractor and Architect/Engineer, shall form basis for acceptance or rejection of installed work.

B. Samples:

1. Submit three (3) samples of each type and color of tile required, not less than 12" square on plywood or hardboard backing and grouted. Submit samples of trim and 6" long sample of the marble threshold(s). Review will be for color, pattern and texture only. Compliance with all other requirements is the exclusive responsibility of the Contractor.

1.05 DELIVERY AND STORAGE:

- A. Deliver packaged materials and store in original containers with seals unbroken and labels in tact until time of use, in accordance with manufacturer's instructions.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. Quarry Tile (QT)

1. Quarry Tile shall meet the requirements of ANSI A137.1-1988
2. Provide 6" x 6" x ½" quarry tile, as manufactured by:
 - a. Quarry Tile, manufactured by American Olean - Quarry Naturals. Contact: Robin Speer, Virginia Tile 734-765-6875.
 1. Color: As selected by Architect from all price groups.
 2. Provide with Q3565U cove base 5" x 6" x ½" and all required trim pieces.

B. Porcelain Pavers (PCT:1)

1. Shall meet requirements of TCA 137.1 and the requirements of this section.
2. Porcelain pavers for floor shall be:
 - a. Beljn Series Collection by Crossville 24" x 24"
 1. Field: Ext finish
 - a. Color: Toasted Waffle
 2. Accent: Ups finish
 - a. Color: Black Iron
 3. Available at Virginia Tile. Contact: Robin Speer 1-734-765-6875

C. Porcelain Pavers (PCT: 2)

1. Shall meet requirements of TCA 137.1 and requirements of this Section.
2. Porcelain pavers for walls shall be as follows:
 - a. Field (stacked bond pattern)
 1. Ups Finish - 12 x 24 (30cm x 60cm) Color Blox 2.0 line by Crossville. Color: Tree House CBX14. Available at Virginia Tile, 1-734-765-6875 Contact: Robin Speer.
 2. Provide with all required trim pieces.
 - b. Accent band
 1. Polished Finish accent band comprised of a vertical band of 3" x 3" x 12" individual porcelain tile with (4) colors installed loose in a random pattern from the Color Blox 2.0 Line by Crossville. Colors consist of:
 - a. Little Boy Blue CBX38
 - b. Slinky CBX03
 - c. Boot Black CBX32
 - d. Cotton Sheets CBX31Available at Virginia Tile, 1-734-765-6875, Contact: Robin Speer, CSI.
 2. Provide with all required trim pieces.

D. Finishing/Edge Protection Profiles

1. Provide profiles as indicated below and on drawings as manufactured by Schluter Systems L.P., Contact: Robin Speer, Virginia Tile, 734-765-6875.
 - a. Corner Guard
 1. Schluter ECK-E: Roll formed type 304 (V2A) steel V-shaped profile with 1-15/32 inch (37mm) wide exposed surfaces joined by a symmetrically rounded corner with integrated trapezoid-perforated anchoring legs.
 2. Provide full height of wall, column or counter as indicated on drawings.
 - b. Border Profile
 1. Schluter Quad-EC: Profile with square visible surface, integrated trapezoid-perforated anchoring leg, and integrated grout joint spacer in stainless steel type 304 (V2A).
 2. Provide between porcelain tile wall and existing masonry or HM/steel/aluminum surfaces.
 3. Provide separation (bituminous coating) between stainless steel and aluminum.
 - c. Cove shape profile (for floors)
 1. Schluter DILEX-EHK U9 cove shaped profile in type 304 (V2A) stainless steel.
 2. Provide between floor and wall tile as shown on drawings.
 3. Provide with 90° inside and outside corners, connectors and matching end caps.

2.02 SETTING MATERIALS

- A. MEDIUM SET MORTAR - for wall and floor tile installation unless noted otherwise.
 1. Description: Factory prepared mortar and latex additive; complying with ANSI A118.4 and ISO standards C2TES1P1. Medium bed thickness; 3/8 to 3/4 inch thick floor installation.
 - a. Color: Gray
 - b. Acceptable Products:
 - i. MAPEI UltraFlex LFT, complies with ANSI A118.4
 - ii. Custom Building Products, MegaLite.
 - iii. Laticrete, 4XLT.
 - Iv TEC Ultimate Mortar

- B. Latex-Portland Cement Mortar: ANSI A118.4, composed as follows :
1. Mixture of Dry-Mortar Mix and Latex Additive: Mixture the prepackaged dry-mortar mix and liquid-latex additive complying with the following requirements:
 - a. Latex Additive: Acrylic resin.
 2. Provide one of the following products:
 - a. Mapei, Elk Grove Village, IL; Kerabond/Keralastic
 - b. Custom Building Products, Custom Blend/Custom Flex
 - c. Laticrete, Bethany, CT; Laticrete 272/333
 - d. TEC, Palatine, IL; Full set plus/Xtra Flex Additive
- C. Waterproofing and Crack Isolation Membrane: Provide materials complying with ANSI A118.10 and ANSI A118.12 and as specified below. Note: All tile (walls & floors) to be installed on crack isolation membrane.:
1. Mapelastic AquaDefense as manufactured by MAPEI Corp.
 2. Custom building products RedGard waterproofing and crack prevention membrane.
 3. Hydroment ultra-set advanced as manufactured by Bostik, Inc.
 4. Hydro-Ban waterproofing/anti-fracture membrane as manufactured by Laticrete International, Inc., Bethany, CT.
 5. Hydraflex as manufactured by TEC. Ready to use, flexible, mold and mildew resistant waterproofing and crack isolation membrane for interior and exterior applications.

2.03 GROUTING MATERIALS

- A. Epoxy-modified Grout Admixture: Complying with ANSI A118.8 and A118.3.
1. Provide one of the following manufacturers:
 - a. Mapei, Kerapoxy.
 - b. Custom Building Products, 100 Solids Epoxy Grout
 - c. TEC, EFX 100% Epoxy Grout
 - d. Laticrete, Bethany, CT, Spectralock Pro Grout.
- B. Color: As selected by Architect.

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2.04 MISCELLANEOUS MATERIAL

- A. Latex Underlayment: Quick set type, as recommended by membrane manufacturer, as required to provide positive drainage to floor drains.
- B. Sealer for Quarry Tile: Shall be a penetrating sealer as manufactured by Aqua Mix Inc., Santa Fe Springs, California, Miracle Sealants Penetrating Sealer, Arcadia, CA, or Architect approved equivalent. (Seal prior to grouting).
- C. Sealants for control joints in floors and walls, use one part fungicidal silicone rubber to match grout:
 - 1. Dow Corning 784
 - 2. Laticrete Latasil silicone sealant meeting Fed. Spec. TT-S-001543, Class A or B.
 - 3. TEC AccuColor 100, 100% silicone sealant low VOC ASTM C920.

PART 3 - EXECUTION

3.01 INSPECTION:

- A. Installer must examine the areas and conditions under which tile work is to be installed and notify the General Contractor, in writing, of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the Installer.

3.02 PREPARATION:

- A. Prepare substrate to receive setting bed and tile recommended both by the manufacturer of the tile and of the setting bed materials.
 - 1. Fill cracks, holes and depressions with trowelable leveling and patching compound according to tile setting material manufacturer's written instructions.
 - 2. Remove protrusions, bumps and ridges by sanding or grinding.
 - 3. Provide concrete substrates for tile floors that comply with flatness tolerances specified in ANSI A108.

- B. Clean substrate as required and recommended to achieve bond using cleaners, detergents, etc.
- C. Neutralize and seal substrates as recommended.

3.03 INSTALLATION:

A. Tile Installation - General:

1. Provide installation of ceramic tile in accordance with the latest edition of the Tile Council of America's "Handbook for Ceramic Tile Installation."
2. Fit tile carefully against trim and around pipes, electrical boxes and other built-up fixtures so that escutcheons, plates and collars will completely overlap cut edges.
3. Smooth exposed edges and clean tile before installation.
4. Install porcelain ceramic tile with a 1/8" joint.
5. Joint designs shall be symmetrical within room or area; border tile be not less than 1/2 normal width. Floor tile shall be set in straight line design, with wall joints in alignment with floor tile where possible.
6. At junction of base tile and wall tile, at projections through tile and at junctions of tile to shower receptors, corner guards and similar equipment, leave joint ungrouted for sealing.
7. When using tile sheets, minimize tearing sheets apart.

3.04 SETTING METHODS

- A. Method and typical detailing for tile work shall be in accordance with the following TCA alphanumeric method, listing from the "Handbook for Ceramic Tile Installation", latest edition, by the Tile Council of America.

B. Concrete Subfloors

1. Slabs on grade (thin-set method - at Hawthorn): TCA setting method F115-24 (provide with waterproof and crack isolation membrane) thin set latex portland cement mortar, ANSI A118.4, epoxy grout A118.3 and complying with tile installation specification ANSI A108.5 and epoxy grout installation specification ANSI A108.6.
2. Slabs on grade (full set method - at Titan Express): TCA setting method F114-24 (provide with waterproof and crack isolation membrane) full set Portland cement mortar; epoxy grout A118.3 complying with tile installation specification ANSI A118.4 and epoxy grout installation specification ANSI A108.6. Install crack isolation membrane per manufacturer's specs.

C. Walls

1. Masonry (Cement Mortar Bond Method): TCA Setting Method W211-24 with latex-portland cement mortar, ANSI A118.4 and epoxy grout ANSI A118.3, install per Tile Installation Specification: ANSI A108.6. Install crack isolation membrane per manufacturer's specs.

3.05 GROUTING

- A. Grouting shall be installed in accordance with ANSI A108.6 and the manufacturer's recommended procedures and precautions during application and cleaning.
- B. Rinse tilework thoroughly with clean water before and after using chemical cleaners.
- C. Base Installation:
 1. Over concrete and masonry, install base using dry-set portland cement mortar in accord with ANSI A108.5. Grout in accordance with ANSI A108.6 using epoxy grout specified for related tile floor.
- D. Jointing Pattern: Lay tile in pattern indicated. Layout tile work and enter tile fields both directions in such space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint width, unless otherwise shown.

E. Expansion and Control Joints: Provide as indicated on drawings and as recommended by TCA and by tile and setting bed and grouting material manufacturer and as follows:

1. Control Joints Locations: Comply with the Tile Council of America. (TCA) and where indicated.

a. Interior Locations (horizontal and vertical):

1. Over any expansion joint, control joint, cold joint or seismic joint in the building structure.
2. Expansion joints - 24 feet to 36 feet in each direction.
3. Expansion joints - 8 feet to 12 feet where tile work located in direct sunlight or moisture locations.
4. Where tile abuts restraining surfaces such as perimeter walls, dissimilar floors, curbs, columns, pipes, ceiling and where changes occur in backing materials.
5. Coordinate joint locations with the Architect and for other areas indicated or required.
6. Joint width shall be 3/8 inch, unless otherwise indicated.
7. Provide under-layment systems.
8. Install compatible sealant and color approved by the Architect.

F. Grout all tile using commercial epoxy grout as specified.

1. Temporarily protect tile as required to prevent staining.

3.06 ADJUST AND CLEAN:

A. Cleaning:

1. Clean grout and setting materials from face of tile while materials are workable. Leave tile face clean and free of all foreign matter.
2. Tile may be cleaned with acid solutions only when permitted by the tile and grout manufacturer's printed instructions, but not sooner than 14 days after installation. Protect metal surfaces, cast iron, and vitreous plumbing fixtures from effects of acid cleaning. Flush the surface with clean water before and after cleaning.

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B. Finished Tile Work:

1. Leave finished installation clean and free of cracked, chipped, broken, unbonded, or otherwise defective tile work.

C. Protection:

1. Apply a protective coat of neutral protective cleaner to completed tile work.
2. Protect installed tile work with Kraft paper or other heavy covering during the construction period to prevent damage and wear.
3. Prohibit all foot and wheel traffic from using tiled floors for at least (3) three days, preferably (7) seven days.
4. Before final inspection, remove protective coverings and rinse neutral cleaner from all tile surfaces.

END OF SECTION 09300

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SECTION 09510 - ACOUSTICAL CEILINGS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

- A. Attention is directed to Division 0, Bidding and Contract Requirements, and to Division 1, General Requirements, which are hereby made a part of this Section.

1.02 DESCRIPTION OF WORK:

- A. The extent of acoustical panel ceiling is shown on the drawings and in schedules.

1.03 QUALITY ASSURANCE:

- A. Subcontract the installation of acoustical panel ceilings to an experienced installation firm which is acceptable to the manufacturer of the acoustical units, as shown by current written statement from the manufacturer.
- B. Standard for Terminology and Performance: Applicable publications by the Acoustical and Insulating Materials Association (AIMA), including "Performance Data, Architectural Acoustical Materials."
- C. Fire Hazard Classification: UL tested, listed and labeled as Class 0.25.

1.04 SUBMITTALS:

- A. Product Data:
 - 1. For information only, submit PDF copy of manufacturer's product specifications and installation instructions for each acoustical panel ceiling material required, and for suspension system, including certified laboratory test reports and other data as required to show compliance with these specifications. Distribute one additional copy of each installation instruction to the Installer.
 - a. Include manufacturer's recommendations for cleaning and refinishing acoustical panel, including precautions against materials and methods which may be detrimental to finishes and acoustical performance.

1.05 SAMPLES

1. Submit (3) sets of 12" square Samples for each acoustical panel required. In each set of samples show the full range of exposed color and texture to be expected in the completed work. Sample submittal and Architect's review will be for color and texture only. Compliance with other requirements is the exclusive responsibility of the Contractor.
2. Submit (3), 12" long samples of exposed runner and molding. Architect's review will be for color and texture only. Compliance with other requirements is the exclusive responsibility of the Contractor.

C. Maintenance Stock:

1. At the time of completing the installation, deliver stock of maintenance materials to the Owner. Furnish full size units matching the units installed, packaged with protective covering for storage and identified with appropriate labels. Furnish an amount equal to 5.0% of the amount installed.

1.06 JOB CONDITIONS:

- A. Space Enclosures: Do not install until interior acoustical panel ceilings unit space has been enclosed and is weather-tight, and until wet work in the space has been completed and is nominally dry and until work above ceilings has been completed, and until ambient conditions of temperature and humidity will be continuously maintained at values near those indicated for final occupancy.

PART 2 - PRODUCTS

2.01 CEILING UNITS:

A. Acoustical Panels: Titan Express

1. Provide 24" x 24" vinyl face laminated gypsum panel units not less than 1/2" thick, NRC n/a, CAC 40, light reflectance not less than 77%, square edge.

2. Acceptable Products:
 - a. USG: Item No. 3260 "Sheetrock Lay-in Ceiling Panel Clima Plus"
 - b. Certainteed: 1142-CRF-1 "Vinylrock"
3. Install in 15/16" exposed tee grid.

2.02 CEILING SUSPENSION MATERIALS:

- A. General: Comply with ASTM C 635, as applicable to an intermediate duty suspension system. Coordinate with other work supported by or penetrating through the ceilings, including light fixtures and HVAC equipment.
- B. Attachment Devices: Size for (5) times the design load indicated in ASTM C 635, Table 1, Direct Hung.
 1. Hanger Wires: Galvanized carbon steel, ASTM A 641, soft temper, prestretched, yield-stress load of at least (3) times design load but not less than 12 USWG.
- C. Exposed Suspension System: Exposed systems compatible with tiles specified and as follows:
 1. Armstrong - 15/16" Prelude XL exposed tee grid.
 2. CertainTeed - 15/16" Classic Aluminum Capped Stab System.
 3. Donn - DX24 System; USG Interiors
 4. Chicago Metallic Corp: 1200 System.
- D. Edge Moldings: Manufacturer's standard channel molding for grid type used for edges and penetrations of ceiling, with a single flange of molding exposed, finish to match grid.

2.03 MISCELLANEOUS MATERIALS:

- A. Acoustical Sealant: A heavy-bodied, non-shrinking, non-drying, non-sag grade mastic compound intended for interior sealing of concealed construction joints.
- B. Tile Cement: As recommended by tile manufacturer.

PART 3 - EXECUTION

3.01 INSPECTION AND PREPARATION WORK:

- A. Installer must examine the conditions under which the acoustical ceiling work is to be performed and notify the General Contractor, in writing, of unsatisfactory conditions. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the Installer.
- B. Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling. Avoid the use of less-than-half widths units at borders, and comply with reflected ceiling plans wherever possible.

3.02 INSTALLATION:

- A. General: Install material in accordance with manufacturer's printed instructions and comply with governing regulations as indicated, and industry standards applicable to the work.
- B. Install suspension systems to comply with ASTM C 636 with hangers supported only from building structural members as indicated. Locate hangers near each end and spaced 4' - 0' along direct-hung runners, unless otherwise indicated.
 - 1. Secure wire hangers by looping and wire-tying, either directly to structures or to inserts, eye-screws, or other devices which are secure and appropriate for the substrate, and which will not deteriorate or fail with age or elevated temperatures.
- C. Install edge moldings at edges of each acoustical ceiling area and at locations where edge of units would otherwise be exposed after completion of the work, except where adhesively applied.
 - 1. Sealant Bed: Apply continuous ribbon of acoustical sealant, concealed pm back of vertical leg before fastening to vertical surface.

2. Secure moldings to building construction by fastening with screw-anchors into the substrate through holes drilled in not more than 16" o.c. along each molding.
 3. Level moldings with ceiling suspension system to level tolerance of 1/8" in 12' - 0".
 4. Miter corners of moldings accurately to provide hair- line joints, securely connected to prevent dislocation.
- D. Cope exposed flanges of intersection suspension system members so that flange faces will be flush (cope flange of member supported by other member) except as otherwise indicated.
- E. Install acoustical panels in coordination with suspension system, with edges concealed by support of suspension members. Scribe and cut panels to fit accurately at penetrations.
- F. Install edge trim moldings where indicated and elsewhere as needed to conceal edges of acoustical units which would otherwise be exposed to view after completion of the work. Anchor with fasteners, or if not possible, secure in place with permanent adhesive.

3.03 CLEANING AND PROTECTION:

- A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension members; comply with manufacturer's instructions for cleaning and touch-up of minor finish damage. Remove and replace work which cannot be successfully cleaned and required to permanently eliminate evidence of damage.
- B. The Installer shall advise the General Contractor of required protection for the acoustical panel ceilings, including temperature and humidity limitations and dust control, so that the work will be without damage and deterioration at the time of acceptance by the Owner.

END OF SECTION 09510

SECTION 09772 - DECORATIVE FIBERGLASS REINFORCED WALL PANELS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Prefinished polyester glass reinforced plastic sheets and adhered to unfinished cementitious wallboard.
[PVC] trim.
- B. Products Not Furnished or Installed under This Section:
Cementitious substrate board.

1.2 RELATED SECTIONS

- A. Section 09280 - Cementitious substrate board.

1.3 REFERENCES

- A. American Society for Testing and Materials:
Standard Specifications (ASTM) ASTM D 790 -
Flexural Strengths (psi)
ASTM D 790 - Flexural Modulus (psi)
ASTM D 638 - Tensile Strengths (psi)
ASTM D 638 - Tensile Modulus (psi)
ASTM D 2583 - Barcol Hardness
ASTM D 256 - Izod Impact Strengths (ft #/in)
ASTM D 696 - Thermal Coefficient of
Lineal Expansion (in/in/F) ASTM D 570 -
Water Absorption (%)
ASTM D 792 - Specific Gravity
ASTM D 3359 - Cross-cut Adhesion
ASTM D 3273 - Mold & Mildew
ASTM D 5319 - Standard Specification for Glass-Fiber
Reinforced Polyester Wall and Ceiling Panels.
ASTM E 84 - Standard Test Method for Surface Burning
Characteristics of Building Materials.

1.4 SUBMITTALS

- A. Product Data: Submit manufacturer's data to indicate compliance with these specifications, including:
Storage, handling and preparation instructions and recommendations.
Installation instructions.
- B. Shop Drawings: Submit elevations of each wall showing location of paneling and trim members with respect to all discontinuities in the wall elevation.
- C. Selection Samples: Submit manufacturer's standard color pattern selection samples representing manufacturer's full range of available colors and patterns.
- D. Samples for Verification: Submit appropriate section of panel for each finish selected indicating the color, texture, and pattern required.
Submit complete with specified applied finish.
For selected patterns show complete pattern repeat.
Exposed Trim Molding: Provide samples of each type, finish, and color.
- E. Manufacturers Safety Data Sheets (SDS) for adhesives, sealants and other pertinent materials prior to their delivery to the site (available as downloads for most Marlite's products at <http://www.marlite.com/tech-details.aspx> or by contacting Marlite at info@marlite.com).

1.5 QUALITY ASSURANCE

- A. Conform to building code requirements for interior finish for smoke and flame spread requirements as tested in accordance with:
ASTM E 84 (Method of test for surface burning characteristics of building Materials) Wall
Required Rating - Class [C].

- B. Sanitary Standards: System components and finishes to comply with:
United States Department of Agriculture (USDA) / Food Safety & Inspection Services (FSIS) requirements for food preparation facilities, incidental contact.
Food and Drug Administration (FDA) 2013 Food Code 6-101.11. Canadian Food Inspection Agency (CFIA) requirements.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials factory packaged on strong pallets.
- B. Store panels and trim lying flat, under cover and protected from the elements. Allow panels and adhesive to acclimate to room temperature (range of 60 to 75°F) for 48 hours prior to installation.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Building are to be fully enclosed prior to installation with heat (70° or similar room temperature) and ventilation consistent with good working conditions for finish work.
- B. During installation and for not less than 48 hours before, maintain an ambient temperature and relative humidity within limits required by type of adhesive used and recommendation of adhesive manufacturer.
- C. Provide ventilation to disperse fumes during application of adhesive as recommended by the adhesive manufacturer.

1.8 WARRANTY

- A. Furnish (1) one-year guarantee against defects in material.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURER

- A. Marlite; 1 Marlite Drive, Dover, OH 44622. 800-377-1221 FAX (330) 343-4668 Email: info@marlite.com
www.marlite.com.
- B. Product:
Symmetrix™ SmartSeam FRP Panels with Sani-coat Sealer

2.2 PANELS

- A. Fiberglass reinforced thermosetting polyester resin panel sheets complying with ASTM D 5319.
Finishing: BlueSky™ Advanced Finishing System: Spray-applied Sani-coat Sealer covers entire panel including grooves and features water-based coatings and controlled, low-temperature inline curing.
Dimensions:

Thickness - 0.090" (2.29mm) nominal
Width - [4'-0" (1.22m)] nominal
Length - [4'-0" (1.22m)] nominal

Tolerance:
Length and Width: +/-1/8" (3.175mm)
Square - Not to exceed 1/8" for 4' (1.2m) panels, 8' (2.4m) panels or 5/32" (3.96mm) for 10' (3.0m) panels
- B. Properties: Resistant to rot, corrosion, denting, peeling, and splintering.
 - 1. Flexural Strength - 0.9×10^4 psi per ASTM D 790.
 - 2. Flexural Modulus - 6.0×10^6 psi per ASTM D 790.
 - 3. Tensile Strength - 11.5×10^3 psi per ASTM D 638.
 - 4. Tensile Modulus - 0.45×10^6 psi per ASTM D 638.
 - 5. Barcol Hardness (scratch resistance) - 28 per ASTM D 2583.
 - 6. Izod Impact Strength - 6.0 ft. lbs./in ASTM D 256
 - 7. Thermal Coefficient of Lineal Expansion - 2.22×10^{-5} in/in/F per ASTM D 696
 - 8. Water Absorption - 0.15% per ASTM D 570.
 - 9. Specific Gravity - 1.8 per ASTM D 792.

10. Cross-cut Adhesion - 0 removed per ASTM D 3359
11. Mold & Mildew - Pass per ASTM D 3273.
Standard Specification for FRP Wall Panels - per ASTM D 5319
Standard Test Method Surface Burning Characteristics of Building Materials - Class C per ASTM E 84.

C. Back Surface: Smooth. Imperfections which do not affect functional properties are not cause for rejection.

D. Front Surface: Smooth As Indicated on the Drawings.

E. Panel Color and Groove Color: Refer to Drawings for additional information.

1. SYM SS 100 BlueSky Digital Print Panel and White Grooves.
2. The graphics will be composed of the following Sherwin Williams colors:
 - a. White - SW7006 Extra White (Field & outline of logo and letters)
 - b. Black - SW6258 Tricorn Black (Outline of logo and letters)
 - c. Blue - SW6965 Hyper Blue (Logo and letters)

F. Finish Gloss Level:

1. High Gloss

G. Tile Pattern, Groove Direction, Tile Size & Panel Size: [Specifier to choose.]

1. Subway Vertical Direction
 - a) 12" x 24" tiles, panel size 4' x 8' nominal

H. Fire Rating: Class C (III) Fire Rating.

2.3 TRIM MOLDING

- A. PVC Trim: Thin-wall semi-rigid extruded PVC. Use only as needed.
M 370 Edge, 8' length
Color: extruded custom harmonizing color

2.4 ACCESSORIES

- A. Adhesive: Either of the following construction adhesives complying with ASTM C 557.
 - Marlite C-551 FRP Adhesive - Water- resistant, non-flammable adhesive. [3.5 gallon can]. Use over porous subwall only, such as unfinished drywall.
 - Titebond Advanced Polymer Panel Adhesive - VOC compliant, non-flammable, environmentally safe adhesive. [3.5 gallon can]. Use over non-porous subwall.
 - Marlite C-109 Low VOC Cartridge Adhesive required for interlocking SmartSeam Panels. [28-ounce cartridge]
 - Marlite MS-250 Clear Silicone Cartridge Sealant for interlocking SmartSeam Panels. [10-ounce cartridge]

PART 3 - EXECUTION

3.1 PREPARATION

- A. Examine sub wall to determine that corners are plumb and straight, surfaces are smooth, uniform, clean and free from foreign matter, nails countersunk, joints and cracks filled flush and smooth with the adjoining surface. Verify that stud spacing does not exceed 24" (61cm) on-center.
- B. Repair defects prior to installation.
 - Level wall surfaces to panel manufacturer's requirements.
 - Remove protrusions and fill indentations.

3.2 INSTALLATION

- A. Comply with manufacturer's recommended procedures and installation sequence.
- B. Cut panels to meet supports allowing 1/8" (3 mm) clearance for every 8 feet (2.4m) of panel. Cut and drill with carbide tipped saw blades or drill bits or cut with shears.

- C. Apply panels to board substrate, above base, vertically oriented with seams plumb and pattern aligned with adjoining panels.
Install panels with manufacturer's recommended gap for panel field and corner joints.
Adhesive trowel and application method to conform to adhesive manufacturer's recommendations.
For interlocking SmartSeam Panels (non-continuous vertical joints, i.e. subway groove configuration), apply Marlite C-109 Low VOC Cartridge adhesive using swirl technique at jagged panel edges.

- D. Apply panel moldings to all panel edges using silicone sealant providing for required clearances.
All moldings must provide for a minimum 1/8" (3mm) of panel expansion at joints and edges, to insure proper installation.
Apply sealant to all moldings, channels and joints between the system and different materials to assure watertight installation.

3.3 CLEANING

- A. Remove excess sealant from panels and moldings. Wipe panel down using a damp cloth and mild soap solution or cleaner.

- B. Refer to manufacturer's specific cleaning recommendations Do not use abrasive cleaners.

END OF SECTION 09772

SECTION 09900 - PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

- A. Attention is directed to Division 0, Bidding and Contract Requirements, and to Division 1, General Requirements, which are hereby made a part of this Section.

1.2 DESCRIPTION OF WORK:

- A. The extent of painting work is shown on the drawings and schedules, and as herein specified. (Note: Multiple colors, both field & accent colors will be used at each area or space)
- B. The work includes painting and finishing of interior and exposed items and surfaces throughout the area, except as otherwise indicated.
- C. The work unless noted otherwise includes field painting of exposed bare and covered pipe and ducts (excluding color coding), and of hangers, exposed steel and iron work, and primed metal surfaces of equipment installed under the mechanical and electrical work, except as otherwise indicated.
- D. Surface preparation, priming and coats of paint specified are in addition to shop-priming and surface treatment specified under other sections of work.
- E. "Paint" as used herein means all coating systems materials, including primers, emulsions, enamels, stains, sealers and fillers and other applied materials, whether used as prime, intermediate or finish coats.
- F. Paint all exposed surfaces in areas designated "paint" in "schedules," except where the natural finish of the material is specifically noted as a surface not to be painted. Where items or surfaces are not specifically mentioned, paint them the same as adjacent similar materials or areas.

1.3 PAINTING NOT INCLUDED:

- A. The following categories of work are not included as part of the field-applied finish work, or are included in other sections of these specifications:
1. Shop Priming: Unless otherwise specified, shop priming of ferrous metal items is included under the various sections for structural steel, miscellaneous metal, hollow metal work, and similar items.
 2. Pre-Finished Items: Unless otherwise indicated, do not include painting when factory-finishing or installer finishing is specified for such items as (but not limited to) metal toilet enclosures, acoustic materials, casework, finished mechanical and electrical equipment including light fixtures, switchgear and distribution cabinets, but not light or power panels where exposed elevator entrance frames, doors and equipment.
 3. Concealed surfaces: Unless otherwise indicated, painting is not required on surfaces such as walls or ceilings in concealed areas and generally inaccessible areas, foundation spaces, furred areas, utility tunnels, pipe spaces, duct shafts and elevator shafts.
 4. Finished Metal Surfaces: Metal surfaces of anodized aluminum, stainless steel, chromium plate, copper, bronze and similar finished materials will not require finish painting, unless otherwise indicated.
 5. Operating Parts and Labels:
 - a. Moving parts of operating units, mechanical and electrical parts such as valve and damper operators, linkages, sinkages, sensing devices, motor and fan shafts will not require finish painting unless otherwise indicated.

- b. Do not paint over any code-required labels, such as Underwriters', Laboratories and Factory Mutual, or any equipment identification, performance rating, name or nomenclature plates.

1.4 DELIVERY AND STORAGE:

- A. Deliver all materials to the job site in original, new and unopened packages and containers bearing manufacturer's name and label, and the following information:

- 1. Name or title of material.
- 2. Fed. Spec. Number, if applicable.
- 3. Manufacturer's stock number and date of manufacturer.
- 4. Manufacturer's name.
- 5. Contents by volume, for major pigment and vehicle.
- 6. Constituents.
- 7. Thinning instructions.
- 8. Application instructions.
- 9. Color name and number.

1.5 JOB CONDITIONS:

- A. Apply water-base paints only when the temperature of surfaces to be painted and the surrounding air temperatures are between 50 degrees F. and 90 degrees F., unless otherwise permitted by the paint manufacturer's printed instructions.
- B. Apply solvent-thinned paints only when the temperature of surfaces to be painted and the surrounding air temperatures are between 45 degrees F. and 95 degrees F. unless otherwise permitted by the paint manufacturer's printed instructions.
- C. Do not apply paint in snow, rain, fog or mist; or when the relative humidity exceeds 85% or to damp or wet surfaces; unless otherwise permitted by the paint manufacturer's printed instructions.

1. Painting may be continued during inclement weather only if the areas and surfaces to be painted are enclosed and heated within the temperature limits specified by the paint manufacturer during application and drying periods.

PART 2 - PRODUCTS

2.1 COLORS AND FINISHES:

- A. Prior to beginning work, the Architect will furnish colors for surfaces to be painted. Colors will vary from wall to ceiling and from room to room. Final selection for gloss level will be by Architect and may not necessarily be the same as scheduled.
 1. Use representative colors when preparing samples for review.
 2. Final acceptance of colors will be from samples applied on the job.
- B. Color Pigments: Pure, non-fading, applicable types to suite the substrates and service indicated.
- C. Paint Coordination: Provide finish coats which are compatible with prime paints used. Review other sections of these specifications in which prime paints are to be provided to ensure compatibility of total coatings system for various substrates. Upon request from other trades, furnish information on characteristics of finish materials proposed for use, to ensure compatible prime coats are used. Provide barrier coats over incompatible primers or remove and reprime as required. Notify the General Contractor and Architect in writing of any anticipated problems using specified coating systems with substrates primed by others.

2.2 INTERIOR PAINTING SCHEDULE:

A. Concrete Masonry Surfaces (Semi-Gloss) (Vinyl Acrylic Latex System)

1. Primer: Vinyl Acrylic Block Filler
S-W: ProMar Interior/Exterior Block Filler, B25W25.
PPG: PPG SPEEDHIDE® Int/Ext Latex Masonry Block Filler 6-7.
P & L: Prohide interior/exterior block filler Z8485
Benjamin Moore: Moorcraft interior and exterior block filler #173
2. Finish Coats: Vinyl Acrylic Semi-Gloss Enamel (25-35 units at 60 degrees F.), 1.5 DFT/coat.
S-W: (2 coats) ProMar 200 Interior Latex Semi-Gloss Enamel, B31W200.
PPG: (2 coat) PPG SPEEDHIDE® Interior Enamel Latex Semi-Gloss 6-500 Series
P & L: Provide gold S/G Z8300 Series
Benjamin Moore: (2 coats) Moorcraft latex semi-gloss enamel #1416

B. Metal-Ferrous (Semi-Gloss):(Alkyd Enamel System, Maximum VOC content 450 grams/liter)

1. Primer: Modified Alkyd Resin Primer, 3 mils DFT/coat
S-W: Kem Kromik Universal Metal Primer, B50Z
PPG: Speedhide Interior/Exterior WB Alkyd Satin
P & L: Steel tech universal metal primer, S4751 white S4752 red/oxide
Benjamin Moore: Iron clad retardo rust inhibitive paint, 163.
2. Finish Coats: Alkyd Enamel, Semi-Gloss (40-50 units at 60 degrees F.) 3.0 mils DFT/coat.
S-W: (2 coats) Alkyd Enamel, Semi-Gloss B34W200.
PPG: (2 coats) Speedhide Interior/Exterior WB Alkyd Semi-Gloss
P & L: Techguard maintenance enamel S4500 Series
Benjamin Moore: (2 coats) satin impervo

- C. Metal - Galvanized (Semi-gloss): Code #5.13 (Acrylic Latex System)
1. Finish Coats: 100 percent Acrylic, Waterborne, Semi-Gloss (30-40 units at 60 degrees F.) 3.0 mils DFT/coat.
S-W: (2 coats) DTM Acrylic coating, B66W200.
PPG: (2 coats) PPG PITT-TECH@ Plus EP DTM Acrylic Semi-Gloss 90-1610
P & L: (2 coats) Enducryl S/G DTM Z6600 Series
Benjamin Moore: (2 coats) DTM acrylic semi-gloss (M2a)
- D. Gypsum Board (Flat):(Acrylic Latex System)
1. Primer: Vinyl Acrylic Latex, 1.1 mils DFT/coat
S-W: ProMar 200 Latex Wall Primer, B28W200.
PPG: SPEEDHIDE@ Zero Interior Zero-voc Latex Sealer6-4900
P & L: Prohide gold high hold out wall primer, Z8165
Benjamin Moore: Moorcraft undercoater (284)
 2. Finish Coats: Vinyl Acrylic Flat (0-5 units at 90 degrees F.), 1.4 mils DFT/coat.
S-W: (2 coats) ProMar 200 Latex Flat Wall Paint, B30W200.
PPG: (2 coats) PPG SPEEDHIDE@ Zero VOC Interior Latex Paint Flat 6-70ZV Series
P & L: (1 or 2 coats) Prohide gold flat Z8100 Series
Benjamin Moore: (2 coats) Moorcraft latex flat (275)
- E. Gypsum Board (Semi-Gloss):(Acrylic Latex System)
1. Primer: Vinyl Acrylic Latex, 1.1 mils DFT/coat
S-W: ProMar 200 Latex Wall Primer, B28W200.
PPG: SPEEDHIDE@ Zero Interior Zero-voc Latex Sealer6-4900
P & L: Prohide gold high hold out wall primer, Z8165.
Benjamin Moore: Moorcraft undercoater (284)

2. Finish Coats: Vinyl Acrylic Semi-Gloss (25-35 units at 60 degrees F.), 1.5 mils DFT/coat.
S-W: (2 coats) ProMar 200 Semi-Gloss Enamel, B31W200.
PPG: (2 coats) PPG SPEEDHIDE@ Zero VOC Interior Latex Paint Semi-Gloss 6-500ZV Series
P & L: Prohide gold S/G, Z8200 Series
Benjamin Moore: (2 coats) Moorcraft latex semi-gloss (276)

PART 3 - EXECUTION

3.1 INSPECTION:

- A. Applicator must examine the areas and conditions under which painting work is to be applied and notify the General Contractor in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the Applicator.
- B. Starting of painting work will be construed as the Applicator's acceptance of the surfaces and conditions within any particular area.
- C. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions otherwise detrimental to the formation of a durable paint film.

3.2 SURFACE PREPARATION:

- A. General:
 1. Perform preparation and cleaning procedure in strict accordance with the paint manufacturer's instructions and as herein specified for each particular substrate condition.

2. Remove all hardware, hardware accessories, machined surfaces, plates, lighting fixtures, and similar items in place and not to be finish-painted, or provide surface-applied protection prior to surface preparation and painting operations. Remove, if necessary for the complete painting of the items and adjacent surfaces. Following completion of painting of each space or area, reinstall the removed items by workmen skilled in the trades involved.
3. Clean surfaces to be painted before applying paint or surface treatments. Remove oil and grease prior to mechanical cleaning. Program the cleaning and painting so that contaminants from the cleaning process will not fall onto wet, newly-painted surfaces.

B. Cementitious Materials:

1. Prepare cementitious surfaces to be painted by removing all efflorescence, chalk, dust, grease, oils, and by roughening as required to remove glaze, conforming to SSPC13.
2. Determine the alkalinity and moisture content of the surfaces to be painted by performing appropriate tests. If the surfaces are found to be sufficiently alkaline to cause blistering and burning of the finish paint, correct this condition before application of paint. Do not paint over surfaces where the moisture content exceeds that permitted by the manufacturer's printed directions.

C. Ferrous Metals:

1. Clean ferrous surfaces, which are not galvanized or shop-coated of oil, grease, dirt, loose mill scale and other foreign substances by solvent or mechanical cleaning conforming to SSPC SP-1 and SSPC SP-2, SSPC-SP-3 or SSPC-SP7 NACE-No. 4 (brush off blast cleaning).

D. Galvanized Surfaces:

1. Clean free of oil and surface contaminants with an acceptable non-petroleum based solvent per SSPC SP-1.

3.3 MATERIALS PREPARATION:

- A. Mix and prepare painting materials in accordance with manufacturer's directions.
- B. Store materials not in actual use in tightly covered containers. Maintain containers used in storage, mixing and application of paint in a clean condition, free of foreign materials and residue.
- C. Stir materials before application to produce a mixture of uniform density and stir as required during the application of the materials. Do not stir surface film into the material. Remove the film and if necessary, strain the material before using.

3.4 APPLICATION:

A. General:

1. Apply paint in accordance with the manufacturer's directions. Use applicators and techniques best suited for the substrate and type of material being applied.
2. Apply additional coats when undercoats, stains or other conditions show through the final coat of paint, until the paint film is of uniform finish, color and appearance. Give special attention to insure that all surfaces, including edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
3. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Paint surfaces behind permanently-fixed equipment or furniture with prime coat only before final installation of equipment.

4. Paint interior surfaces of ducts where visible through registers or grilles with a flat, non-specular black paint.
5. Paint the back sides of access panels and removable or hinged covers to match the exposed surfaces.
6. Finish exterior doors on tops, bottoms and side edges the same as the exterior faces, unless otherwise indicated.
7. Sand lightly between each succeeding enamel or varnish coat.
8. Omit the first coat (primer) on metal surfaces which have been shop-primed and touch-up painted, unless otherwise indicated.

B. Scheduling Painting:

1. Apply the first-coat material to surfaces that have been cleaned, pretreated or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
2. Allow sufficient time between successive coatings to permit proper drying. Do not recoat until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure and the application of another coat of paint does not cause lifting or loss of adhesion of the undercoat.

C. Minimum Coating Thickness:

1. Apply each material at not less than the manufacturer's recommended spreading rate to establish a total dry film thickness as indicated or, if not indicated, as recommended by coating manufacturer.

D. Mechanical and Electrical Work:

1. Painting of mechanical and electrical work is limited to those items exposed in occupied spaces and includes all exterior exposed work.

E. Prime Coats:

1. Apply a prime coat of material which is required to be painted or finished, and which has not been prime coated by others.
2. Recoat primed and sealed surfaces where there is evidence of suction spots or unsealed areas in first coat, to assure a finish coat with no burn-through or other defects due to insufficient sealing.

F. Pigmented (Opaque) Finishes:

1. Completely cover and provide an opaque, smooth surface of uniform finish, color, appearance and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness or other surface imperfections will not be acceptable.

G. Transparent (Clear) Finishes:

1. Use multiple coats to produce glass-smooth surface film of each luster. Provide a finish free of laps, cloudiness, color, irregularity, runs, brush marks, orangpeel, nail holes, or other surface imperfections.
2. Provide satin finish for final coats, unless otherwise indicated.

H. Completed Work:

1. Match approved samples for color, texture and coverage. Remove, refinish or repaint work not in compliance with specified requirements.

3.5 CLEAN-UP AND PROTECTION:

A. Clean-up:

1. During the progress of the work, remove from the site all discarded paint materials, rubbish, cans and rags at the end of each work day.
2. Upon completion of painting work, clean window glass and other paint- spattered surfaces. Remove spattered paint by proper methods of washing and scraping, using care no to scratch or otherwise damage finished surfaces.

B. Protection:

1. Protect work of other trades, whether to be painted or not, against damage by painting and finishing work. Correct any damage by cleaning, repairing or replacing and repainting, as acceptable to the Architect.
2. Provide "Wet Paint" signs as required to protect newly-painted finishes. Remove temporary protective wrappings provided by others for protection of their work, after completion of painting operations.
3. At the completion of work of other trades, touch-up and restore all damaged or defaced painted surfaces.

END OF SECTION 09900

WARREN WOODS PUBLIC SCHOOLS
TOWER HS-TITAN EXPRESS SERVERY
HAWTHORN FOOD PROGRAM
FREEZER REPLACEMENT

242030

MARCH 11, 2025

SECTION 09972 - CONCRETE AND MASONRY COLOR TREATMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Water Based Stain

1.2 RELATED SECTIONS

- A. Section 04300 - Unit Masonry.

1.3 REFERENCES

- A. ASTM C 744 - Standard Specification for Calcium Silicate Masonry Units.
- B. SCAQMDR 1168 - South Coast Air Quality Management District's (SCAQMD) Volatile Organic Compounds (VOC) Rule 1168.

1.4 SUBMITTALS

- A. Submit under provisions of Section 01340 "Shop Drawings, Product Data and Samples".
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Product characteristics.
 - 2. Preparation instructions and recommendations.
 - 3. Storage and handling requirements and recommendations.
 - 4. Installation methods.
- C. Preliminary Samples: To be provide as required for the specific project.
- D. Verification Samples: To be provided on the specific materials to be treated when they are available in plant or on site.
- E. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

1.5 QUALITY ASSURANCE

- A. **Manufacturer Qualifications:** An international manufacturer with a minimum of (20) twenty years of experience in the production of the stains and coatings of type specified.
- B. **Installer Qualifications:** Installer licensed by Nawkaw to apply the stain products specified and with a minimum of (3) three years documented experience in applying stains and coatings similar in type and scale to this Project.
- C. **Environmental Regulations:** The masonry stain material to be applied is in compliance with federal, provincial and local environmental Volatile Organic Compounds (VOC) regulations.
- D. **Mock-Up:** Apply a minimum one square foot sample of each type of color application required.
 - 1. Finish areas designated by Architect.
 - 2. Prepare each sample in an area where it will be exposed to the same conditions as will be present on the building during curing.
 - 3. Samples should be viewed from a minimum distance of 20 feet.
 - 4. Do not proceed with remaining work until color and finish is approved by Architect.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store and handle products in accordance with requirements of manufacturer.
- C. Store materials inside if possible, away from sparks or open flame. Store in a secure area to avoid tampering and contamination. Water based materials must be kept from freezing.

1.7 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.8 WARRANTY

- A. At project closeout, provide Owner or Owner's Representative an executed copy of the manufacturer's standard limited warranty against manufacturing defects, outlining its terms, conditions and exclusions from coverage.
 - 1. Duration: 25 years.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: Nawkaw Inc., which is located at: 170 Whitetail Way, Bogart, GA 30622; Toll Free Tel: 866-462-9529; Tel: 706-355-3217; Email: info@nawkaw.com; Web: <http://www.nawkaw.com/>
- B. Substitutions: Not permitted.

2.2 WATER BASED STAIN

- A. NawTone (Formally NECT-90):
 - 1. General: NawTone: high-quality, water-based, highly permeable acrylic stain. Mold, mildew, UV and weather resistant.
 - 2. Properties:
 - a. Viscosity: (72° F) 70° - 90° KU.
 - b. pH: 8.5 - 9.5.
 - c. Finish: Flat.
 - d. Nonflammable (ASN/ZS 1530.3-1999)
 - e. VOC: <5 g/L (SCAQMDR 1168)
 - f. Abrasion Resistance: excellent
 - g. Freeze/Thaw Test (ASTM C216-86): exceeded
 - h. Salt Attack Resistance (AS/NZS 4456.10): no blisters

- i. Water Vapor Transmission (ASTM E96-05) 0.337 g/hr m²
- j. Water Vapor Permeance (ASTM E96-05) 6.6x10⁻⁸ g/Pa s m²
- k. UV Resistant-Accelerated Weathering (ASTM G154:2000, ASTM G53-88, D2244-89) 2000 hrs: excellent

3. Finish:

- a. Color: To match existing substrate (masonry).

PART 3 EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. Verify that new masonry has cured at least 21 days prior to applying NawTone.
- C. Verify that surfaces being color treated with Nawtone have a neutral pH, are clean, dry and free of efflorescence.

3.2 PREPARATION

- A. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- B. Clean surfaces thoroughly prior to installation. Allow surfaces to dry completely before applying coating.
- C. Verify that walls, masonry, and mortar that may have been treated with any form of chemical/acid wash are neutralized.
- D. Treat alkali or efflorescence with proper neutralizing compounds as recommended by masonry supplier before stain application.

- E. Before application verify that the masonry walls have a neutral pH level.
- F. Before application verify that surface to be treated is clean, dry and contains no frozen water.
- G. Mix products as recommended immediately prior to application.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Apply stain using airless spray pump to help control airborne particles or overspray. If site conditions prohibit spray application, apply by hand; utilizing brushes and rollers.
- C. Do not proceed with work when ambient temperatures are less than 25 degrees F (-4 degrees C) or greater than 110 degrees F (43 degrees C).
- D. Allow manufacturer's specified drying time for each coat before applying next coat (if required).
- E. Verify color consistency. Recoat areas where blotches, blemishes or imperfections are present.

3.4 FIELD QUALITY CONTROL

- A. Verify color consistency. Recoat any area that are unacceptable.

3.5 PROTECTION

- A. Protect installed products until completion of project.
- B. Protect prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels as required.
- C. Protect shrubs, metal, wood trim, glass, asphalt and other building hardware during application from overspray.

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TOWER HS-TITAN EXPRESS SERVERY
HAWTHORN FOOD PROGRAM
FREEZER REPLACEMENT

242030

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- D. Do not permit mist (if spraying) or liquid to drift onto surrounding properties or parking lots.
- E. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 11400 - FOODSERVICE EQUIPMENT

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Foodservice Equipment:** Standard manufactured and custom fabricated items.
- B. Inclusive of Job:** The work under this section consists of providing all labor, material, products, and equipment that are necessary and required for the complete installation of the food service equipment, as indicated on drawings, and as herein specified.

1.02 RELATED SECTIONS

- A. Architectural Documents:** All work described in these documents must be carefully coordinated with the work of those other trades directed by the terms and conditions of the Architect's and Engineer's documents. The drawings and specifications of the Architect shall direct the Foodservice Equipment Contractor with respect to the project schedule, contract issues, coordination and payment requirements. These documents can be obtained by contacting the Architect.
- B. Contract:** All work by the Foodservice Equipment Contractor shall be performed under the contract and payment terms and conditions as defined in the American Institute of Architects document: A101 Standard Form of Agreement Between Owner and Contractor, 1987 edition, modified by substituting the words "Foodservice Consultant" in place of the word "Architect" and amended to include all of the work as outlined in the project documents of the Foodservice Consultant, for primary requirements, and Architect, for building and engineering reference information. Execute this contract agreement after notice of award of contract, prior to start of work, but not later than 15 days after Notice to Proceed. Provide a copy of the contract to Food Service Designs.

1.03 COORDINATION WITH OTHER TRADES

- A. The Foodservice Equipment Contractor shall perform the following:**
 - 1. Furnish loose to the Mechanical Contractor; gas hoses, pressure regulators, vacuum breakers, water filters, faucets, waste valves, overflows, swirl sprays, solenoid valves and floor troughs where specified.
 - 2. F.E.C. shall coordinate location of grease traps with the Mechanical Contractor. Grease traps must be easily accessible for cleaning and maintenance. Under no circumstances will legs, bases, cross bracing, supports or undershelves be cut or modified in the field. Modifications or adjustments will be made at the factory.
 - 3. F.E.C. shall coordinate location of soda chases with installing trades. All chases will be located under counters and cabinets and free of obstructions. Under no circumstances will any part of the chase be exposed or counters modified in field.
 - 4. F.E.C. shall coordinate roll down shutter doors with installing trades. The tracks must be incorporated into backsplashes, counters, tables, equipment, etc. for a clean and finished look.

Under no circumstances will counters be modified in field.

B. The Mechanical Contractor shall perform the following:

1. Make all final utility connections between the rough-in point and the equipment.
2. Provide all final interconnections including; faucets, sink drains, sink waste valves, overflow connections, disposer piping, trough veyors, hot food wells and floor troughs.
3. Provide traps, connecting pipe, valves, stops, floor drains, floor sinks, grease traps, and all other hardware, supplies and parts necessary for the performance of work under this contract; unless specified otherwise in the item specification. All exposed plumbing above the counter and in direct line of site shall be stainless steel or chrome plated.
4. Properly install all drain assemblies and shut-off valves for sinks, hot food wells, etc. All drain assemblies must be installed per all local health department prevailing codes.
5. All work must meet all applicable state and local codes and conditions.
6. Provide and obtain all permits, licenses and approvals required. Permit fees will be paid by the Mechanical Contractor.

C. The Electrical Contractor shall perform the following:

1. Make all final connections between the rough-in point and the equipment.
2. Provide all final interconnections including; disposers, cold pans, food wells, walk-ins, ventilation systems, serving counters, etc.
3. Furnish all safety cut-outs, line disconnect devices, shunt trip breakers, power panels, power cords, receptacles, outlets, conduit, wire and other electrical controls, fittings, and connections necessary for food service equipment, with the exception of controls, disconnects and fittings integral to the food service equipment, which shall be furnished by the Food service Equipment Contractor.
4. All work must meet all applicable state and local codes and conditions.
5. Provide and obtain all permits, licenses and approvals required. Permit fees will be paid by the Electrical Contractor.

D. The Other Contractors shall perform the following:

1. The Other Trades shall provide necessary flues and/or vents of size and capacity required to operate fixtures. Roof openings, flashing and sealing for food service ventilation shall be provided by the Other Trades.
2. The Other Trades shall provide necessary sleeves or chases of size and capacity required for refrigeration lines and wiring harnesses. Roof openings, flashing and sealing for food service

refrigeration lines shall be provided by the Other Trades.

1.04 DEFINITIONS AND ABBREVIATIONS

- A. General Explanation:** Certain terms and abbreviations used in Contract Documents are defined generally in this article. Definitions and explanations of this section are not necessarily either complete or exclusive, but are general for the work to the extent not stated more explicitly in another provision of Contract Documents.
- B. F.E.C.:** Food service Equipment Contractor. "F.E.C." abbreviates "Food service Equipment Contractor."
- C. G.C.:** General Contractor. "G.C." abbreviates "General Contractor." As read, work by the General Contractor refers to work by the General Contractor and their subcontractors.
- D. B.I.B.:** Base Item Bid. "B.I.B." abbreviates "Base Item Bid." The Base Item Bid is material, product, or equipment identified in the specifications as the standard to be provided. In the Item Specifications for foodservice equipment, each item identifies a single manufacturer as the Base Item Bid. The Base Item Bid is to be distinguished from Contractor's Options, Alternates, and Substitutions.
- E. Alternate:** A different material, product, equipment, specialty, system, or other part of the work than that which is the Base Item Bid, and for which the Owner desires a comparative quotation. An alternate carries no presumption of being equal to the Base Item Bid. Rather, it represents a different product, system, specialty or approach under consideration for use in the work. Alternates are governed by the terms and conditions of Part 1.06 of this Section.
- F. Furnish:** Except as otherwise defined in greater detail, term "furnish" shall mean and intend supply and delivery to project site, unloading, unpacking, assembly, installation, calibration and operator training as appropriate in each instance.
- G. Install:** Except as otherwise defined in greater detail, term "install" shall mean and intend that the contractor shall perform all work as outlined in the Contract Documents, shall assemble all specified equipment of the contract in one piece in the required locations of the building, and shall make necessary connections as specified within these Contract Document Specifications.
- H. Provide:** Except as otherwise defined in greater detail, term "provide" shall mean and intend furnish and install, tested and clean, complete and ready for intended use, as appropriate in each instance.
- I. Indicated:** The term "indicated" is a cross-reference to graphics, notes or schedules on drawings, to other paragraphs, or schedules in the specifications, and to similar means of recording requirements in Contract Documents. Use of terms such as "shown," "noted," "scheduled," and "specified" used in lieu of "indicated," is intended only to help reader locate cross-reference and not limitation of location is intended.
- J. Directed, Requested, etc.:** Where not otherwise explained, terms such as "directed," "requested," "selected," "approved," "required," "accepted," and "permitted" mean "directed by Food Service

Designs," "requested by Food Service Designs," and the like. However, no such implied meaning shall extend responsibility of Food Service Designs into Contractor's area of supervision.

- K. Project Site, Job Site:** The space available to Contractor for performance of the Work, either exclusively or in conjunction with others performing other work as part of the Project.
- L. Or:** Used in inclusive sense to indicate alternatives of any item or any combination or items in a list unless otherwise indicated.
- M. Include:** The word include and its forms is not meant to limit provisions to a list nor to exclude other, unnamed items from a list which it precedes. The phrase, "but not limited to," may be assumed to follow uses of the word include and including.
- N. Installer:** The entity (person or firm) engaged by Contractor or its subcontractor for performance of a particular unit of work at project site, including installation, erection, application and similar required operations. It is a general requirement that such entities (Installers) be expert in operations they are engaged to perform.
- O. RPZ:** Abbreviates reduced pressure zone backflow preventer.
- P. Cross Connection:** Means a connection or arrangement of piping or appurtenances through which a backflow could occur. Cross connections may be made "directly" or "indirectly".
- Q. Backflow:** Means water of questionable quality, wastes, or other contaminants entering a public water supply system due to a reversal of flow. Backflow can occur by either backpressure or backsiphonage conditions.
- R. Backpressure:** Backpressure conditions occur when the downstream pressure exceeds the upstream pressure.
- S. Backsiphonage:** Backsiphonage is caused by a vacuum or partial vacuum in a water supply system.

1.05 INDEMNIFICATION, INSURANCE AND SAFETY REQUIREMENTS

Prior to commencement of construction, the Contractor shall advise all insurance agents and companies retained by the Contractor of the conditions and provisions of this Contract pertaining to indemnification, insurance and waivers of subrogation. Failure of the Contractor to so notify the aforesaid agents and companies shall in no way relieve the insurance companies policies from their obligations under this contract. All insurances required and maintained under these provisions shall be considered primary insurance as respects the owner and it's agents, officials and employees, and any other insurance or self-insurance maintained by them shall be considered excess and shall not contribute with the policies to be maintained by the Contractor.

- A.** The contractor shall indemnify and hold harmless the owner and it's agents, officials and employees, against and from all claims, judgments, losses, damages, demands, payments, recoveries, legal proceedings, orders, and decrees of every nature and description, including attorneys' fees, arising

out of or resulting from the Contractor's or subcontractors' performance or nonperformance of the Contract.

The Contractor shall waive any rights of subrogation against the owner and its agents, officials and employees, for personal injury or property damage arising from the Contractor's performance or nonperformance of the Contract. In the event of any payment by any insurer of the Contractor under any policy of insurance, the insurer of the Contractor shall not be subrogated to any of the Contractor's rights of recovery therefore against the Owner. The Contractor waives any and all rights of recovery against the Owner for losses occurring to any property insured by the Contractor arising from this Contract. To the extent that there is property insurance coverage for damage to the Work, the Owner agree to waive their right of subrogation against the Contractor and any subcontractors.

- B.** The Foodservice Equipment Contractor entering into a contract under these specifications thereby agrees to be held wholly responsible for the faithful execution of the same and for all damages occurring from a failure to do so; and no expense or trouble through oversight, concealment, or otherwise, shall relieve the Foodservice Equipment Contractor from such a responsibility. The Foodservice Equipment Contractor will, as a prerequisite for this contract, possess insurance as follows:

Workers Compensation

Statutory Limits

Employer's Liability

\$ 500,000.00 min.

General Liability, Commercial Form

(including Premises Operations Contractual (Indemnification) Insurance, Products and Completed Operations Hazard - maintained to beneficiary occupancy, Broad Form Property Damage, Independent Contractors Protective)

Bodily Injury and

Ea. occurrence

\$ 500,000.00 min.

Property Damage,

Combined Single

Aggregate

\$ 1,000,000.00 min.

Limit

Products/Completed

Aggregate

\$ 1,000,000.00 min.

Operations

Personal Injury

Aggregate

\$ 500,000.00 min.

Automobile Liability, Comprehensive Form

(including Owned, Hired, and Non-Owned)

| | | |
|------------------------|-----------------------|---------------------------|
| Bodily Injury | Ea. person | \$ 500,000.00 min. |
| | Ea. accident | \$ 500,000.00 min. |
| Property Damage | Ea. occurrence | \$ 500,000.00 min. |

Excess Liability, Umbrella Form

(including excess third party liability)

| | | |
|------------------------|-----------------------|-----------------------------|
| Bodily Injury | Ea. occurrence | \$ 1,000,000.00 min. |
| Property Damage | Aggregate | \$ 1,000,000.00 min. |
| Combined | | |

C. The Contractor shall provide, in addition to the project bid prices, separate pricing for the following insurances:

1. Builder's Risk or Installation Floater

Coverage, with an insurer approved by the Owner, to be in force from date that work on the project begins to date of final completion and acceptance by the Owner. Coverage shall be written to cover "All Risks" of physical loss, including flood, theft, vandalism and malicious mischief. The coverage shall include personal property and fixtures to be installed, whether or not in place, stored elsewhere, or in transit at the risk of the insured(s).

a) Coverage shall be on a non-reporting 100% replacement value basis with any co-insurance requirement being waived by an agree amount endorsement.

b) The policy shall include, as named insured, the Owner, as their interests may appear.

D. The Owner may, at its option, elect to accept either or both coverages as specified in Section 1.06 B & C above at the cost provided by the Contractor, or decline either or both coverages supplied by the Contractor and deduct the appropriate allowances from the project price bid. The Owner may, at its option, elect decision by the Owner to forego the purchase of either or both indemnity which the Owner may have with respect to the work performed under the Contract.

E. Safety and Compliance with Laws and Regulations: The Contractor shall at all times observe and comply with all Federal, State, local and/or municipal laws, ordinances, rules and regulations which may in any manner affect the equipment and materials used in the proposed Project, those employed on the Project, and the conduct of the Project. The Contractor shall save harmless and indemnify the Owner and their agents, officials and employees, against any claim or liability arising from the violation of any Federal, State, local and/or municipal laws, ordinances, rules and regulations, whether the violations are by the Contractor or any subcontractors.

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

2. The Contractor shall promptly notify the Owner of any damages or loss arising out of or in connection with the performance of the Contractor, or any subcontractors, and shall cooperate with any insurer in the investigation, remediation and settlement of any damage or loss.

The above Contractual (Indemnification) and Excess (Umbrella) Liability Insurance must name Food Service Designs, the Architects, the Owner, and their officials and employees, as additional insured. Any of the above insurance must be written by a company licensed to do business in Michigan during the Contract. Certificates of Insurance must be submitted to each insured and must contain transcripts from the proper office of the insurer, evidencing the additional insured, the extent of insurance, the location and operations to which the insurance applies, the expiration date, plus the mandatory provision that coverages will not expire or be canceled without at least 30 days prior written notice to each insured by certified or registered mail. Insurance coverage shall remain in effect for a period of ninety (90) days from the date of final project acceptance.

Do not commence Contract work until these minimum insurance requirements are active. Establishment of these minimum requirements shall not be construed to mean same are adequate for the type and method of work to be performed and/or that the Foodservice Equipment Contractor rely on the type and limits for the Contractor's operations. The Foodservice Equipment Contractor is totally responsible to broaden the scope and limits as necessary for the potential maximum exposure and risk involved.

1.06 SPECIFIED MANUFACTURERS & ALTERNATES

A. Specified Products & Materials: Certain, definite brands of materials, products, and equipment are specified as the standard of quality. These brands constitute the base item bid (abbreviated hereinafter as B.I.B.) Where one or more additional brands are named as B.I.B., the bid may be based on any one of the named brands.

B. Voluntary Alternates: Bidders are encouraged to suggest and quote other brands of the same quality that they may desire to substitute. It is not the intention to discriminate against other brands or manufacturers whose materials, products or equipment is equal or better to what has been specified. Rather, the naming of a specific brand is intended to establish a definite standard. These shall be submitted as Voluntary Alternates.

1. Voluntary Alternates must be proposed independently of the base bid. and mandatory alternate bid.
2. The Owner reserves the right to accept or reject any alternate bid. Bids must be based on B.I.B. items as specified, not per mandatory or voluntary alternates.

C. Substitutions: Substitutions will not be accepted. Requests for substitutions will be considered before award of Contract when extensive revisions to contract documents are not required and changes are in keeping with general intent of Contract Documents, when fully documented and properly submitted, when any conditions stated elsewhere in the bid documents are satisfied, and when one or more of the following conditions are satisfied, all as judged by Food Service Designs.

1. Where the required product, material, or method cannot be provided within Contract Time, but not

as a result of F.E.C.'s failure to pursue the work promptly or coordinate various activities properly;

2. Where required product, material, or method cannot be provided in a manner which is compatible with other materials of the work, or cannot be properly coordinated therewith, or cannot be warranted as required, or cannot be used without adversely affecting Owner's insurance coverage on completed work, or will encounter other substantial non-compliances which are not possible to otherwise overcome except by making requested substitution, which F.E.C. thereby certifies to overcome such non-compatibility, non-coordination, non-warranty, non-insurability or other non-compliance as claimed;
3. Where substantial advantage is offered Owner, in terms of cost, time, energy conservation or other valuable considerations, after deducting offsetting responsibilities Owner may be required to bear, including additional compensation to Food Service Designs for redesign and evaluation services, increased cost of other work by Owner or separate contractors, and similar considerations.
4. Request for a substitution constitutes representation that F.E.C. has investigated proposed substitution and determined that it meets or exceeds specified product in all respects unless deficiencies are conspicuously noted; will provide same warranty for substitution as for specified product; will coordinate installation and make other changes which may be needed for work to be complete in all respects and do so at his expense; and waives claims for additional costs which may subsequently become apparent. Where such modifications require work by others, such as but not limited to the Owner, to the General Contractor, to Other Trades, to the Architect, Engineer, or Food Service Designs, the cost of said work will be billed ("back charged") against the F.E.C.'s contract.
5. Only one request for substitution will be considered for any single product. If substitution is not accepted, provide specified product.
6. F.E.C.'s submittal of (and Food Service Designs' acceptance of) shop drawings, product data, or samples which relate to work not complying with requirements of contract documents, does not constitute an acceptable or valid request for a substitution, nor approval thereof.
7. No substitutions will be permitted subsequent to award of Contract except under emergency conditions such as the sudden and unexpected discontinuance of an item of equipment by the manufacturer. Determination of what conditions warrant emergency substitutions shall be at Food Service Designs' judgment.
 - a. Identification of product or equipment being replaced by substitution, including related specification section and drawing numbers, product data, drawings, and catalog sheets and fully documented to show compliance with requirements for substitutions.
8. Because of the practice of certain foodservice equipment manufacturers of offering rebates, gifts, "spiffs," bonuses, premiums, and other benefits to foodservice equipment dealers as well as individual sales people, and because the eligibility for such benefits may have an influence on the

decision by a F.E.C. to propose a substitution, the receipt of and the eligibility for such benefits must be explicitly described. For each proposed substitution, provide statement fully answering the following questions:

- a. Is your firm eligible for any benefit, including but not restricted to, rebate programs based on quantities purchased in a given period, reductions in future prices, discounts, cash rewards, or credits, should the proposed substitution be accepted?
 - b. Is any individual in your firm eligible for a cash payment, gift, reward, "spiff," or any other form of benefit if the proposed substitution is accepted?
9. Be prepared to attest to accuracy and completeness of this disclosure if requested by Food Service Designs. Said attestation shall be in the form of a written statement from an officer of the manufacturer attesting to the accuracy and completeness of the F.E.C.'s disclosure. Where the manufacturer is represented by another firm for marketing purposes (commonly referred to as a manufacturer's rep), an officer of the representing firm also shall provide a signed statement attesting to the accuracy and completeness of the F.E.C.'s disclosure. Refusal or inability to provide said statements when requested shall be considered a withdrawal of the proposed substitution.

The fact that a F.E.C. or individual related to him are eligible for benefits should the proposed substitution be accepted does not provide sufficient cause for the proposed substitution to be declined. However, where there is a difference in judgment between the Owner or Food Service Designs and the F.E.C. as to whether the proposed substitution is in fact an equal to the B.I.B., said benefits will be considered in the decision of whether to accept the proposed substitution.

- 10 The substitution may require changes in the other parts of the work. By acceptance of a proposed substitution no representation is made that the nature or extent of such modifications have been determined except as specifically identified by the F.E.C. in his proposal. All changes to the work required by the proposed substitution, whether or not they are identified in the proposal or subsequently become apparent, shall be completed at the expense of the F.E.C.
- 11 Should a substitution be accepted and should the substitute material, product, or equipment prove to be defective or otherwise unsatisfactory for the service intended, as evaluated by Food Service Designs and within the guarantee period as defined in these specifications, the Foodservice Equipment Contractor shall replace this material, product or equipment at no cost to the Owner, with that originally specified.
- 12 If a substitution is accepted it is the F.E.C.'s responsibility to insure the electrical and mechanical requirements are correct for the substituted item.

D. Inability to Meet Project Requirements Without Modification: If base item bid products or equipment must be altered to meet the Specifications, and Bidders make no mention that these alterations cannot be made, it will be interpreted that the bids include the alterations as specified. If Bidders cannot make the alterations that would be required, they must condition their bids with a cover letter stating in what ways the specifications cannot be met and why.

1.07 SUBMITTALS

- A. Distribution:** Submittals shall be in conformance to the requirements set forth below; all submittals shall be to the parties designated by the General Contractor; copied to Food Service Designs.
- B.** The review of submittals is only for compliance to design intent. **Food Service Designs SHALL NOT BE RESPONSIBLE FOR CHECKING DEVIATIONS FROM CONTRACT DOCUMENT REQUIREMENTS OR CHANGES FROM EARLIER SUBMISSIONS UNLESS CONSPICUOUSLY AND SPECIFICALLY NOTED.** Where such changes are indicated on shop drawings, note the drawing changes conspicuously and clearly describe the changes in the transmittal that accompanies the drawing.

The number of copies to be submitted and the deadline for submittal shall be as determined by Food Service Designs. If the number of copies is not specified, eight (8) copies shall be provided. The F.E.C. will be responsible for distribution of drawings and material documents to parties designated by the General Contractor.

- C. Product Data:** Submit buy out brochures, each item shall have a cover sheet with the following information; Item number, manufacturer, quantity, model numbers, service connection requirements, performances, materials, furnished accessories, power and fuel requirements, water and drainage requirements and other similar information. Second sheet shall be a manufacturers cut-sheet showing technical data, and installation recommendations, service connection requirements, performances, materials, model numbers, furnished accessories, power and fuel requirements, water and drainage requirements and other similar information.

1. Where equipment is fabricated, provide cover sheet with the following information; Item number, manufacturer, quantity, the words "SEE MANUFACTURERS SHOP DRAWINGS", service connection requirements, materials, furnished accessories, power and fuel requirements, water and drainage requirements and other similar information.

- D. Shop Drawings of Fabricated Equipment:** Submit dimensioned fabrication drawings for custom fabricated equipment including plans, elevations, and sections, showing materials and gauges used. Cross sections and elevations shall be detailed to a scale of 1-1/2" = 1'-0". Show complete details and dimensions of each item of equipment. Drawings shall be based upon and follow the design drawings and these specifications, without reference to field measurements.

- E. Utility Drawings:** Submit drawings indicating; item numbers, equipment schedule including item number, quantity and description of each item, specific points and types of final connection for all utility requirements for foodservice equipment. Utility connections shall be located both horizontally and vertically and indicate details of connection required on each item. Prepare these drawings at **1/4" = 1'-0" scale**. Submit separate drawings for equipment lay-out, electrical, plumbing and ventilation.

- F. Setting Drawings and Templates:** Submit setting drawing and templates for installation of anchorage devices and for any item where so required in the specifications. Submit setting

drawings and templates at full scale.

G. Verifying Field Conditions: When field measurements have been taken, revise mechanical, electrical and ventilation and fabrication drawings to reflect accurately project conditions. Submit in a timely manner for final review, in quantities as specified for original submittals. It is the F.E.C.'s responsibility to make sure all trades are using the most current drawings.

H. Operator's Manuals: Submit three (3) sets of dimensional prints, data sheets, manuals and instructions for properly operating equipment. Instructions for operating each piece of equipment, together with written guarantee and warranty for each piece of equipment shall be bound in a booklet, and presented to Food Service Designs. These shall be submitted prior to final payment or as determined by Food Service Designs.

1. Provide a list; Provide item number quantity, description, manufacturer, model number, of each piece of equipment and service agency contact, complete with name, and phone numbers.
2. Provide manuals, and instructions for each piece of equipment.
3. Provide manufacturers written guarantee and warranty forms for each piece of equipment.
4. Provide as part of the manual three (3) sets of as-built drawings of each drawing that was supplied by the F.E.C.

I. Samples: Submit samples of materials and products where indicated.

1. Submit three of each sample, two of which shall be returned.
2. Samples shall be of sufficient size and quantity to illustrate the functional characteristics of the product with integral related parts and attachment devices; and to clearly express the full range of color, texture, and pattern.
3. Do not use products in the work until required sample review is complete.

J. Final Distribution: F.E.C. shall be responsible for distributing the most current, up to date information which include, all shop drawings, utility drawings, buy-out books and all other documentation to all parties.

1.08 QUALITY ASSURANCE

A. Manufacturer's Qualifications: The manufacturer must be able to show that it has been regularly engaged in manufacturing of food service equipment of types, capacities, and sizes required, and that its products have been in satisfactory use in similar service for not less than five years.

B. Foodservice Equipment Contractor's Qualifications: Only those firms who can meet the following qualifications will be considered for this work:

1. The F.E.C. shall have at least five years successful experience furnishing and installing foodservice equipment on projects similar in size and scope to that required for this project.
 2. The F.E.C. shall be the recognized distributor for the items of equipment specified herein, if of other manufacture than his own.
 3. F.E.C. shall have the financial resources to enable him to handle the work in a satisfactory manner and to deliver the required items of equipment so as not to delay the progress of the work.
 4. The F.E.C. shall be fully capable of fulfilling the terms and conditions of the warranty provisions required by this contract.
 5. The F.E.C. shall be capable of providing a performance bond when and if required.
 6. Upon demand, the Foodservice Equipment Contractor being considered for possible negotiation shall submit to Food Service Designs evidence of his ability to fulfill these requirements.
- C. Fabricator's Qualifications:** Where specified units require custom fabrication, provide units fabricated by shop with a minimum of five years of experience in similar work. Fabricate all custom equipment items at same shop. Where units cannot be fully shop-fabricated, complete fabrication work at project site must conform to specification.

Approved Fabricators are:

American Stainless, 1600 W Yale Avenue, Englewood, CO 80110, (303) 783-0005

Titan Stainless, 404 State Rd. S-13-903, Pageland, SC 29728 (704) 800-0780

Professional Restaurant Service, 14057 Stephens Rd., Warren, MI 48089 (586) 772-7652

1.09 REFERENCE STANDARDS

- A. Sanitary Construction and NSF Standards:** Comply with applicable National Sanitation Foundation (NSF) standards and recommended criteria. Provide each principal item of food service equipment with a NSF "Seal of Approval".
- B. UL Labels:** Where available, provide UL labels on prime electrical components of food service equipment. Provide UL "recognized marking" on other items with electrical components, signifying listing by UL, where available.
- C. ANSI Standards:** Comply with applicable ANSI standards for electric powered and gas-burning appliances, for piping to compressed gas cylinders, and for plumbing fittings including vacuum breakers and air gaps to prevent siphonage in water piping.
- D. NFPA Codes:** Install food service equipment in accordance with the following National Fire Protection Codes (NFPA) Codes:

NFPA 54 - National Fuel Gas Code.

NFPA 70 - National Electrical Code.

NFPA 96 - Removal of Smoke and Grease-Laden Vapors from Commercial Cooking Equipment.

- E. ASME Boiler Code:** Construct steam generating and closed steam heated equipment to comply with American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code; Section IV for units not exceeding 15 PSI or 250 degrees F, Section I for higher pressure or temperature units.
- F. Health Code:** Install food service equipment in accordance with local health department applicable regulations.
- G. Architectural Millwork:** Casework construction shall be of custom grade in accord with the standards of the Architectural Woodworking Institute, or better. Casework will be considered any construction or fabrication requiring the use of wood or laminate.
- H. Overlapping and Conflicting Requirements:** Where compliance with two or more industry standards or sets of requirements is specified, and overlapping of those different standards or requirements establishes different or conflicting minimums or levels of quality, the most stringent requirement (whether most costly or not) is intended and will be enforced, unless specifically detailed language written into contract documents clearly indicates that a less stringent requirement may be fulfilled. Refer instances of uncertainty as to apparent conflicts of standards to Food Service Designs before proceeding.
- I. Minimum Quality or Quantity:** In every instance, quality level or quantity shown or specified is intended as minimum for the work to be performed or provided. Except as otherwise specifically indicated, actual work may either conform exactly to that minimum (within specified tolerance levels), or may exceed that minimum (within reasonable limits). Refer instances of uncertainty as to quality or quantity intended to Food Service Designs before proceeding.

1.10 STORAGE, DELIVERY AND HANDLING

- A. Storage:** F.E.C. shall provide at his own expense a safe and secure area in which foodservice equipment can be stored. Provide adequate protection from damage to or loss of foodservice equipment. Store foodservice equipment in their original containers.
 - 1. Should the Owner provide a facility for the receiving and storage of foodservice equipment, the F.E.C. shall nevertheless retain full responsibility for the condition of the equipment, shall fully insure it and name the Owner as additionally insured, and shall hold the Owner harmless from any damages or loss that should occur while stored in the Owner's premises.
- B. Delivery:** Do not deliver foodservice equipment until project conditions permit prompt installation. If the Owner, Food Service Designs or General Contractor determine that the site is not ready for any

equipment shipped to same, the F.E.C. will retain said equipment in his storage facilities until the site is ready for installation. Deliver food service equipment to the project site in factory-fabricated containers designed to protect equipment and finish until final installation.

1. Any piece of equipment that proves impractical for delivery in one piece may be delivered in sections, but all working surfaces shall be fitted and field welded, with working surfaces ground and polished on premises, so that upon completion each item of equipment will have true, smooth and even surfaces. Butt jointing and filling with solder will not be permitted.

C. Handling: Handle food service equipment carefully to avoid damage to components, enclosures, and finish. Do not remove covering until required to clean, test, calibrate and demonstrate, the unit. Do not install damaged food service equipment; replace and return damaged components to equipment manufacturer.

D. Scheduling and Timeliness: Delivery and storage of all equipment shall be done at such time when construction, finish and mechanical work have progressed to a point permitting such installation. The details of setting and installation shall be so arranged that work of other contractors shall progress without being unnecessarily interfered with, or damaged.

E. Protection of Equipment: All equipment shall be received at the building or construction site fully insured. It will be the responsibility of the Foodservice Equipment Contractor to protect the equipment until completely installed, connected, and approved by Food Service Designs, subsequent to the completion of the contract work.

1.11 PROJECT CONDITIONS

A. Verification: Check electrical characteristics, and water, steam, and gas pressure. F.E.C. shall provide pressure regulating valves where required for proper operation of equipment.

B. Existing Food Service Equipment (if applicable): F.E.C. shall tag or mark all equipment scheduled to be re-used. This shall be done prior to disconnecting of the equipment. The F.E.C. shall be held accountable for any missing equipment for failure to tag or mark the equipment. All existing equipment shall be removed from the facility prior to construction or at a date specified by the Owner or Food Service Designs.

1. Equipment scheduled for reuse shall be taken to the F.E.C.'s storage area, and stored until it can be transported to the project site and installed. During the time said equipment is in the F.E.C.'s possession, it shall be protected from loss and damage, and shall be delivered to the project site in perfect operating condition.

a) Equipment shall be cleaned.

b) Painted when specified.

c) Repaired or modified to its best working condition when specified.

2. Equipment not scheduled for reuse shall be removed to location(s) designated by the Owner by

others not by the F.E.C. With the Owner's concurrence, the F.E.C. may submit an offer to purchase all or part of the remaining equipment; and/or a cost proposal for removing and disposing of scrap equipment.

3. Disconnects of existing equipment shall be completed by Other Trades.

C. Protection of Work and Property: The Foodservice Equipment Contractor will be held responsible for any damage to Owner's property caused by delivering, uncrating or installing of the Kitchen Equipment. If any damage is caused by the Foodservice Equipment Contractor, his agents, or subcontractors, the Owner's property shall be restored to its original condition at the expense of the Foodservice Equipment Contractor.

D. Use of Premises: The Foodservice Equipment Contractor shall confine the storage of equipment, materials, tools, and all other things related to his work to space allotted to him by the Owner.

PART 2 -- PRODUCTS

2.01 GENERAL STANDARDS OF QUALITY

A. Quality of Material: Unless otherwise specified or shown on drawings, all material shall be new, of best quality, perfect and without flaws. It shall be of the best of their respective kind, equal to the standards of manufacture used by the Southern Equipment Company of St. Louis, Missouri; S. Blickman & Company, Weehawken, New Jersey; or Ruslander & Son, Inc., Buffalo, New York. All labor shall be performed in a thorough workmanlike manner. Work to be performed by qualified, efficient, skilled mechanics of the trades involved.

2.02 MATERIALS

A. New Materials: All materials shall be new, of first grade, no seconds will be acceptable.

B. Gauge: Gauges herein specified shall refer to United States Standard Gauge for sheet metal and plate.

C. Stainless steel: All stainless steel shall be of the gauge specified (U.S. Standard) 18.8 composition which is generally known as Type 302 or Type 304, and shall have a Number 4 Finish (125-150 grit) as manufactured within the continental limits of the United States. Each piece of equipment shall be specified by gauge with either a general specification form or under the item specifications. All sheets shall have a genuine mill finish of not less than 150 grit on one side and not less than 80 grit on the back side. All stainless steel sheets shall bear the manufacturers trade mark, designation of type, and heat number. All stainless steel sheets shall have the following content:

Chromium - 18 percent minimum

Nickel - 8 percent minimum

Carbon - .2 percent maximum

Straight chrome iron or copper bearing straight chrome steel is not acceptable. All stainless steel

sheets shall be stretcher leveled. All sheets shall be free of buckles, warps, and surface imperfections. A hard ground finish will not be acceptable.

- D. Stainless steel sheets:** shall be of cold rolled stock.
- E. Stainless steel pipe and tubing:** ASTM A 554, Type 304 with No. 4 polished finish; shall be seamless or welded, of gauge specified, of true roundness. Seamless tubing shall be thoroughly and properly annealed, pickled and ground smooth. Welded tubing shall be thoroughly heat-treated and properly quenched to eliminate carbide precipitation. V-Clad shall not be permitted.
- F. Galvanized iron:** Wherever specified, galvanized iron shall be of an approved grade of either low carbon steel or copper bearing steel. All sheets are to be commercial quality, stretcher leveled, and re-rolled to insure a smooth surface.
- G. Galvanized Sheet Steel:** ASTM A 526, except ASTM A 527 for extensive forming; ASTM A 525, G90 zinc coating, chemical treatment.
- H. Sheet Steel:** ASTM A 569 hot-rolled carbon steel.
- I. Aluminum:** ASTM B 209 sheet and plate, ASTM B 221 extrusions, 0.40-mill clear anodized finish where exposed, unless otherwise indicated.
- J. Galvanized Iron:** Shall be approved grade of either pure wrought iron or copper bearing steel.
- K. White Metal:** Corrosion-resistant metal containing not less than 21 percent nickel. Make castings free from pit marks, runs, checks, burrs, and other imperfections; rough grind, polish, and buff to bright luster.
- L. Plastic Materials and Components:** Provide plastic materials and components which conform to NSF 51.
- M. High Pressure Decorative Laminate (HPDL):** HPDL shall be selected by the Architect from manufacturer's standard palette of colors, unless otherwise indicated. Provide HPDL conforming to NEMA Standard LD3-1985.
1. Where the use of HPDL with a wear resistant finish is indicated, provide such (e.g. Nevamar's ARP Surface, Wilsonart "Tufsurf 2," etc.) of a nominal thickness of .060"
 2. Where the use of HPDL of solid color or "color through" is indicated, provide such (e.g. "Solikor" by Wilsonart).
 3. F.E.C. shall provide fire rated laminate where required by code.
- N. Hardwood Work Surfaces:** Laminated edge-grained hard maple (*Acer saccharum*), NHLA First Grade with knots, holes and other blemishes culled out, kiln dried at eight percent or less moisture, waterproof glue, machined, sanded, and finished with NSF-approved oil-sealer.
- O. High Density Particle board.** Where indicated in counter or cabinet construction, provide high

density Particle board such as "Novoply."

1. F.E.C. shall provide fire rated laminate where required by code.

P. Plywood. Where cabinet or counter construction calls for plywood, use birch grade paint finish standard or grade as indicated.

Q. Sound Deadening: Sound deaden underside of table with premium type mastic, that "skins" on surface when dry. Surface of mastic coating shall be smooth, equal to the standard for hot-rolled steel finish, 3M Coating #1000 E/C or equivalent.

1. Apply two (2) coatings of sound deadening material to underside of tops, drain boards, dishtables, counters, and sinks.

2. Apply sound deadening during fabrication. Touch up on project site if required.

R. Sealants: ASTM C 920, Type S Grade NS, Class 25, Use NT. Provide sealant that when fully cured and washed meets requirements of Food and Drug Administration Regulation 21 CFR 177.2600 for use in areas where it comes in contact with food.

1. Color: As selected by Food Service Designs from manufacturer's standard colors.

2. Backer Rod: Closed-cell polyethylene rod stock, larger than joint width.

S. Gaskets: Solid or hollow (not cellular) neoprene or PVC; light gray, minimum of 40 Shore A hardness, self-adhesive or prepared for either adhesive application or mechanical anchorage.

2.03 MANUFACTURED OR FABRICATED COMPONENTS

A. Wall Anchors: Wherever it is necessary to mount fixtures that are supported from the wall, the fixtures shall be securely attached thereto by means of stainless steel tapped screws into stainless steel face and anchor type grounds that are built into the walls. Furnish these grounds to other trades at proper time so other trades can build them into the walls as work progresses. Itemized specifications note fixtures requiring such grounds. It is the responsibility of the F.E.C. to coordinate and provide these anchors in a timely manner.

B. Chair Carriers: Furnish chair carriers as needed for hanging wall-mounted equipment. Provide guarantee that chair carriers are of sufficient strength and quantity to support specified load. Chair carrier shall be of all-welded stainless steel construction and mounted within half or full wall so that weight of table and equipment is transferred to floor. Chair carriers may be fabricated or purchased from outside manufacturer. Provide Food Service Designs with drawings of this item for approval prior to fabrication and installation.

C. Floor Anchors: Wherever it is necessary to mount fixtures to the floor, the fixtures shall be securely attached thereto by means of stainless steel tapped screws

D. Faucets: Furnish all faucets including spray rinse units and wall brackets. Drill and finish fixtures in preparation for installation. Provide loose to installing contractors. Faucet nozzles are to be centered over sink drain.

1. Deck mounted faucets with 4" centers shall be Krowne 15-312L, ½" inlet.
2. Deck mounted faucets with 8" centers shall be Krowne 15-512L, ½" inlet.
3. Backsplash mounted faucets shall be Krowne 14-812L or approved equal, ½" inlet.
4. Pot sink full flow faucets shall be Krowne 18-814L or approved equal, ¾" inlet.
5. Wall mounted pot and kettle tilting faucet; dual temp. – Krowne 16-252L; single temp. – Krowne 16-181L, ½" inlet.
6. Built-in dipperwell, faucet and sink – Krowne 16-149.
7. Pre-Rinse faucets; deck mounted – Krowne 17-202WL, splash mounted – Krowne 17-109WL

E. Potable Water Protection & Vacuum Breakers: Furnish all protection devices unless otherwise indicated in the item specifications. Drill and finish fixtures in preparation for installation. Provide loose to installing contractors.

1. Air Gap: The distance of a water inlet or opening above the maximum high water level or overflow rim in a fixture, device, or container. A "safe air gap" is at least 2 times the diameter of the water inlet pipe, but not less than 1 inch and need not be more than 12 inches.
2. Reduced Pressure Principle Device (RPZ): It consists of 2 independently acting internally loaded check valves separated by a reduced pressure zone. A differential pressure relief valve is located within the zone to maintain the reduced pressure and also discharge water to atmosphere during periods of backflow. This device is used as protection for all direct or indirect cross connections. The device may be subject to back pressure or back siphonage of toxic chemicals, sewage, or other lethal substances.
3. Pressure Vacuum Breaker: This device allows air to enter the waterline when the pressure in the public system or the service line is reduced to 0 or below. The device has a vacuum relief valve which is internally loaded, normally by means of a spring. May be installed for use under continuous line pressure. Must be installed at least 12" above the highest outlet it is to serve.
4. Atmospheric Vacuum Breaker: Allows air to enter the waterline when the pressure in the public system or the service line is reduced to 0 or below, however, since the vacuum relief is not internally loaded the device must be installed on a discharge side of the shut off valve. Should not be subjected to continuous flows for periods of more than 12 hours and must be installed at least 6" inches above the highest outlet it is to serve.
5. Double Check Valve Assembly: Consists of (2) two independently acting internally loaded check valves. This device may be used for back pressure or back siphonage situations, only if the cross connection protection is from substances that do not constitute a health hazard.

- F. Rotary Waste Valves:** Provide two-inch, heavy cast-bronze body, removable flat stainless steel strainer, twist handle waste outlet, and one-piece connected chrome-plated brass overflow, unless otherwise stated in the item specifications. Provide waste and overflow by Fisher Faucets, 6100 series, or approved equal.
- G. Casters:** Provide four-inch minimum diameter wheel casters, with 1-1/8 inch tread width, conforming to NSF standards, unless otherwise noted in item specifications. Provide sealed, self-lubricating bearings, cadmium-plated or bright zinc-plated steel disc wheels, and solid synthetic rubber tires. Provide foot brakes on (2) two casters per unit unless otherwise specified.

2.04 ELECTRICAL REQUIREMENTS - GENERAL

- A. Electric Heating Equipment:** Verify to project conditions.
- B. Wiring:** In general, equipment shall be provided with all necessary internal wiring, properly carried externally where required, for termination in junction box, motor starter, et cetera. All wiring provided under this contract shall be in full accordance with the latest edition of the National Electric Code. Further, all wiring provided shall be contained in a metallic raceway, approved by engineer, consisting of a specially fabricated wireway as in the case of work built into counter work, or in conduit of proper material, or Greenfield flexible conduit, all with necessary provisions for grounding continuity. All conductors provided shall have proper temperature ratings.
- C. Thermal overload protection:** All motors of equipment provided shall have the thermal overload protection provided.
- D. Control equipment:** Provide all necessary electrical control equipment and wiring, except as otherwise outlined, mounted on equipment where practicable, or where shown on plan.
- E. Cover plates:** All receptacles to have 1040 stainless steel or chrome plated brass cover plates with stainless steel or chrome plated brass screw for all outlets provide in equipment.
- F. Cords:** Flexible cords to be provided on equipment shall have grounding conductor and shall be of best quality available to industry, equal to Simplex-Tryex, selenium neoprene.
- G. Motor starters:** Provide required starters for all motors. Motor starters required for foodservice equipment and not provided by Other Trades shall be thermal overload protective type, manual wherever possible, equal to New Series Allen Bradley Bulletin #709 magnetic with necessary accessory equipment where required for proper operation. Where required fully magnetic type W.P.B. station shall be furnished. All manual and magnetic type motor starters provided under this contract for 3 phase motors shall be 3 thermal element type, requiring special coordination with starter manufacturer. This requirement is not repeated elsewhere in the detailed specifications.
- H. Motor Thermal Protection:** In instances in which motor thermal protection cannot be built-in where specified into motors provided with equipment, the Food service Equipment Contractor shall provide externally mounted overload devices of proper number of poles and capacity equal to Turnbull "TT" or Allen Bradley, and shall carry wiring from motor terminals to these devices in manner approved by inspection authorities as being in full accord with applicable electrical codes and engineers plans.

- I. **Wire:** Except as otherwise required, all wire provided shall be type THW dual rating. Wire in counter raceways to be heat resistant type, AVA or equal.
- J. **Openings:** Provide proper openings through all equipment and shelves for piping and electrical conduits. All openings are to be located as close to the rear of the counter and sized just big enough for the pipe or wire. All openings shall be smooth, so not to damage or cut the piping or electrical wires.
- K. **Panelboards:** Panelboards shall be UL listed and properly sized in compliance with National Electric Code.
- L. **Floor Based Electrical Connections:** shall be made in a manner that will allow portable equipment connected to the floor electrical supply to pass over the point of connection without interference.
- M. **Code Compliance:** All electric work to be performed in accordance with the National Electric Code and local regulations.
- N. **Other Conditions:** If not provided by other contractors, F.E.C. to provide all electrical parts including but not limited to contactor strips, line shunts, relays, disconnects (both mechanical and electrical), loose parts and labor required for installation of same not provided by other contractors and pertinent to the installation of equipment under this section. A non-limiting example of this type of equipment would be contactor strips required for the proper operation of fire protection systems.

2.05 STEAM PRESSURE, STEAM THERMOSTATS, STEAM COILS

- A. **Steam Pressure:** All steam operated pressure vessels such as Kettles, Steamers, Urns, et cetera, shall be constructed to A.S.M.E. and the Code requirements of the State in which the project occurs and shall bear labels and certificates of compliance therewith.
- B. **Steam Thermostats:** Provide steam thermostats or temperature regulators for steam heated equipment if required for proper operation of the piece of equipment, or if so required in the Itemized Specifications.
- C. **Steam Coils:** All steam coils shall be installed in sufficient quantity to provide ample heat at the available steam pressure (Verify project conditions). They shall be tested for 100 pounds per square inch working pressure.
 - 1. In fixtures having coils under more than one shelf, all coils shall be connected together with inlet and outlet extended down through base of fixture to point indicated on drawings for installation of stop valves and final connection.
 - 2. Unless otherwise specified, coils are to be 7/8" O.D. hard copper tubing with brass fittings. Where immersed in water, coils are to be mounted on strap type brackets or feet with a clearance of not less than 1" below coils for cleaning purposes. These feet are to be soldered water-tight to the bottom of the pan in which coils are mounted. Couplings shall be welded or braised in the bottom or sides of fixtures for steam inlet and outlet, and shall extend through fixture ready for final connections.

3. Boiler permits shall be acquired by the installing contractor and all fees shall be paid by the installing contractor.

2.06 LOCKS

- A. Cabinets and Refrigerated Units:** Provide integral locks on all cabinets and refrigerated units. Locks shall be of sufficient strength to prevent unauthorized entry into the locked space. Locks shall be of the key and cylinder type with tamper-proof mechanisms. Furnish Owner with three (3) sets of keys to each lock at the conclusion of the project, accurately labeled and turned over to the Owner all at one point in time. This lock standard applies to all cabinets unless otherwise indicated in item specifications.

2.07 FABRICATION, GENERAL

- A. Welds:** All workmanship shall be done with welded rod of same composition as sheets or parts welded. Welds shall be strong, ductile, with excess metal ground off and finished smooth to match adjacent surface. Welds shall be free of imperfections as pits, runs, spatter, cracks, et cetera, and shall have the same color as adjacent sheet surfaces. All joints in top fixtures, tables, drainboard, exposed shelving, sinks, et cetera, shall be electrically welded. Butt welds made of spot welding straps under seams and filling in with solder will not be acceptable. It is the intention of these specifications that all welded joints shall be homogeneous with the sheet metal itself. Where sheet sizes necessitate a joint, such joints shall be welded. Tops of fixtures shall be fabricated at the factory with welded joints to reduce field welding.

Under no circumstances are any welds to be spray painted. All welds are to be ground and polished smooth.

- B. Field Joints (Welded):** Where field joints are necessary, the tops shall be continuous. Items shall be made in maximum length sections as possible and with as few joints as necessary. Provide proper joint preparation and location. Access shall be provided, where possible, to the back side of the welds. Joints shall be located to provide the minimum length of seam. Field joints are to be provided only for the convenience of installation and shall be held to an absolute minimum. Show proposed field welds on shop fabrication drawings.
- C. Field Joints (Bolted):** Bolted field joints, if specified as acceptable, are to be drawn tight leaving a hair-line seam and shall not have any exposed screws or rivets. Joints shall be neatly and carefully fabricated to make the very best appearing joint possible. After equipment is set in place, all field joints shall be tightly pulled together leaving only a hair-line seam. The alignment of the joints shall be made in such a manner that they shall be tightened both horizontally and vertically. Show proposed bolted field joints on shop fabrication drawings.
- D. Surfaces:** All surfaces shall be completely free of burrs, rough edges, slag, or any other debris.
- E. Other Exposed Surfaces:** All coved corners, legs, table tops and all other exposed surfaces to be ground smooth and polished to a #4 finish.
- F. Exposed Joints:** All exposed welded joints including field joints shall be suitably ground flush with

the adjoining material and neatly finished to harmonize and appear the same.

- G. Depressions:** Wherever material has been depressed or sunken in by the welding operation, such depressions shall be suitably hammered and peened flush with the adjoining surfaces and, if necessary, again ground to eliminate low spots. All ground surfaces shall then be polished or buffed to match adjoining surfaces consistent with good workmanship.
- H. Discoloration, etc.** Care shall be exercised in all grinding operations to avoid excessive heating of the metal and metal discoloration. In all cases the grain of rough grinding shall be removed by successive finer polishing operations.
- I. Finished Texture:** The texture of the final polishing operation shall be uniform and smooth consistent with reasonable care and good workmanship. The general finish of all metal shall be of high grade.
- J. Break Bends:** Wherever break bends occur, they shall be free of open texture or orange peel appearance; and where such break does not mar the uniformity of the appearance of the material, all such marks shall be removed by suitable grinding, polishing, and finishing.
- K. Sheared Edges:** Wherever sheared edges occur, they shall be free of burrs, projections, and fins to obviate all danger of cutting and laceration when the hand is drawn over such sheared edges.
- L. Miters and Bullnose Corners:** Where miters or bullnose corners occur, they shall be neatly finished with the under edge of the material neatly ground to a uniform condition and in no case will overlapping material be acceptable.
- M. Finish:** It is the intention of these specifications to describe fabrication of a quality finish consistent with the highest grade of manufacturing practices in the industry. Edges of tops and overshelves shall be highly polished or "Hi-Lited" where required by the Item specifications. Final approval of surface finishes shall be by Food Service Designs.

2.08 PIPE CHASES

- A. Pipe Chase Panels:** Where top arrangement of enclosed base tables make it necessary for plumbing and supply piping to be passed through the base, this piping shall be enclosed in a suitable pipe chase with easily removable access panels. These access panels are not to be held in place with screws or latches, but are to be formed up in a pan shape, removable without the use of tools. The foregoing only applies to fixtures where an access is required from the front of the fixture, as in the case of pipe chases at end of fixtures containing bottom and intermediate shelves need not be enclosed unless specifically called for in the Itemized Specifications. Unless otherwise specified, shelves in these fixtures will be turned up a minimum of 3" at the edge of the pipe chase.
- B. Access Panels:** Where access panels are specified, the panels shall be used for access to drains and electrical junction boxes only. The access panels are used for cleaning and maintenance only they shall not be used for electrical, plumbing, chases and rough-in penetrations. The access panel shall be made of matching material and removable with out tools.

- C. Consult with Piping Contractors:** In detailing fixtures, consult with piping contractors to be certain that due space allowance is made for traps and other controls, particularly under lower shelves.
- D. Shelf Penetration:** Where plumbing and supply piping pass through shelves on open base tables, shelves shall be neatly punched or die-stamped for the piping. Show the location of such pipe chases, or stamped pipe openings, on plan and/or detail drawings. Provide sufficient size to accommodate all necessary risers so that additional holes need not be cut in the field. Coordinate with plumbing contractors, cautioning them that all piping must be run through chases or slots as provided.
- E. Utilities Housing:** All utilities for counters and fabricated equipment will be housed in chases constructed for same, pre-wired to minimize field wiring and plumbing.

2.09 SANITARY CONSTRUCTION

- A. Approvals:** All fabricated equipment is to be constructed in strict compliance with the standards of the National Sanitation Foundation as outlined in their bulletin on Food Service Equipment entitled "Standard No. 2" dated September, 1978, and in full compliance with the Public Health Regulations of the locality in which the installation is to be made. All fabricated equipment shall have the seal of approval of the National Sanitation Foundation and if required by code UL approval seal of approval.

2.10 SINKS

- A. Construction:** Sinks and frames shall be constructed of 14 gauge stainless steel. The front shall extend up 2-3/4" higher than the drainboard line and shall be finished with a 1-3/4" wide channel rim, running full length, with ends of sink frame constructed for welding to drain boards where such are specified. Sink bowls, unless otherwise indicated in item specifications, shall be 14 gauge stainless steel fully welded to frames so that no joint is visible. Where required, provide sinks with drain boards, backsplashes, heaters, or water circulation systems.
 1. Where drain boards are required, they shall be electrically welded to the sink frame to provide an integral unit.
 2. Where the sink is free standing without drain boards, the channel rims shall continue around both ends with the corners of the channel edge rounded to conform with the radius of the inside vertical corner of the sink. Corners shall be electrically welded.
 3. Where a backsplash is required, the rear of the backsplash shall extend to the specified height above the drainboard work surface, with the top edge returning to the wall at a 45 degree angle and forming a 2-1/4" clear pipe chase.
 4. The ends of the sinks shall be electrically welded to the body of the sink with all vertical and horizontal corners formed on a 3/4" radius with welds ground and polished smooth to a #4 finish.
 5. Bottom of sinks shall be depressed and slope to a twist handle waste with handle constructed of

- 3/8" stainless steel rod extending to the front of the sink. This twist handle drain shall have a built-in connection for an overflow pipe. Rear of overflow connection to have a polished nickel allow front plate and shall be completely connected to the drain with nickel plated brass tubing. The Twist handle shall be supported by a stainless steel bracket welded to the underside of the sink.
6. Provide at top center rear of each compartment, below the drainboard line, a polished cast nickel bronze overflow with 1-1/4" O.D. brass tubing connection to outlet at back of drain.
 7. Where multiple sink bowls are welded to a frame, a minimum 2" between bowls shall be provided to prevent temperature transfer and front of sinks shall be clad in 14 gauge stainless steel frontispiece.
 8. Where sinks are specified to set into counter tops, the sinks shall be electrically welded to top with continuous weld, ground smooth so that no seam is visible and surfaces match. Drop in sinks with hardware fasteners will not be accepted unless specifically called for in the Item Specifications.
 9. All interior and exterior horizontal and vertical bonds and corners shall be rounded on a 3/4" radius with all joints welded.
 10. Mount fill faucets in backsplash. Single compartment sinks shall be fitted with two (2) holes on 8" centers over the center compartment. Where sinks have two or more compartments, provide two (2) holes on 8" centers over the partition(s). Fit sink(s) with combination chromium plated swing spout faucet(s).
- B. Drain boards:** Construct of #14 gauge polished stainless steel welded integral to the body of the sink with continuous rolled rims and splash of the same height and design as the sink. Roll rim heights at the shallow end shall be 1" high sloping approximately 1/2" to the sink body, unless otherwise specified. All drain boards shall have horizontal corners coved on 1/4" radius with the vertical corners coved on 1/4"radius. Drain boards must slope in the direction of the sink, so water will not pool.
- C. Legs:** Sink legs shall be as specified under "Table and Sink Legs". Legs shall be attached with a #14 gauge stainless steel gusset to the underside of the sink body. The gusset shall be conical shaped and provided with an allen head dog point set screw.
- D. Additional Considerations:** Where so indicated by the Item Specifications, provide sinks as follows:
1. Where "plug and chain drain" is specified, sink bowls shall slope to a drain which shall be a standard 1-1/2" drain with plug and chain.
 2. Where "basket strainer drain" is specified, sink shall be fitted with a 1-1/2" cup strainer assembly.
 3. Where "sink compartment heater" is specified, sink compartment shall be heated with electric immersion elements with low water cutout and thermostatic control, as manufactured by Hatco or

approved equal, and of sufficient wattage to assure 180°F rinse water.

2.11 COUNTER AND TABLE TOPS - METAL CONSTRUCTION

- A. Tops and Edges:** Counter and table tops shall be fabricated with type of edge as specified. The definite choice as to the type of edge profile to be used shall be made before the time of bidding. If unspecified, the edge will be metal edge profile No.3. All tops, unless otherwise specified, shall be 14 gauge stainless steel.
- B. Top Bracing:** Tops shall be braced with 1-1/2" x 1-1/2" x 1/8" galvanized angles and 1-1/2" x 3" x 1-1/2" #14 gauge galvanized channels. On open base tables, one channel shall be placed at each pair of legs. A longitudinal angle shall be placed between the channels for additional top support.
- C. Underbracing:** Underbracing, will be constructed of stainless steel channels, size same as in A & B above. When stainless steel underbracing is utilized, the above sized channel will be used throughout for underbracing.
- D. Top Fastening:** Tops shall be fastened to the framing members with protruding studs. Studs shall be welded to the underside of the table top and fastened by means of chrome plated lock washers and acorn nuts.
- E. Backsplashes:** Backsplashes shall be of the height specified with the standard height being 6" on serving counters, 10" overall on worktables and 10" on dishtables. The splash shall be returned 2" on a 45° angle. All corners of tops formed by bending and/or welding shall have a radius of 3/4".

2.12 SOUND DEADENING

- A. Application:** Apply sound deadening material to all tables, counters, sinks, etc. per section 2.02.

2.13 TABLE AND SINK LEGS

- A. Materials:** All legs for open base tables, sinks, and dishtables shall be constructed of stainless steel, 14 gauge, seam welded and polished to a #4 finish, unless otherwise specified. Cross rails, where required, shall be of 1-1/4" #14 gauge wall welded tubing of stainless steel. Cross rails shall be welded to legs with the resulting welds ground and polished to a smooth finish. All legs shall be fitted with a stainless steel adjustable bullet foot having a minimum of 1" adjustment. All feet furnished shall be vermin proof having closed bottoms of stainless steel with unexposed threads and a minimum clearance between the foot and the leg of 1/32".
- B. Tops:** Tops of legs shall be welded to 14 gauge stainless steel section of channel, closing top of leg, and this channel section shall be sized to nest inside table reinforcing channel and then is bolted in place with stainless steel bolts and lock washers through both vertical channel legs and gusset if open leg type table. Wherever threads of bolts and screws on the inside of fixtures, which are either visible or might come in contact with the hand or wiping cloth, such bolts and screw threads shall be capped with suitable lock washer and chrome plated brass or bronze acorn nut. Where screw threads are not visible or readily accessible, they might be capped with a standard lock washer and steel nut treated to prevent rusting or corroding.

- C. Gussets:** All gussets shall be fully enclosed stainless steel and provided at all leg locations. These gussets shall be one hundred percent (100%) welded to channels in a water-proof, vermin-proof manner. Where gussets occur at angle iron framework provide triangular 12 gauge stainless steel corner plates, welded to bottom edge of angle frame, and weld gusset to triangular plate. These gussets shall have 16 gauge stainless steel exterior case complete with galvanized interior case. Legs shall slip fit into internal case and be held in place with stainless steel set screw.
- D. Cabinet and warmer legs:** All cabinets, warmers, and/or other enclosed bodies unless otherwise specified are to be mounted on round pattern adjustable legs. Legs shall be of 1-5/8" o.d. stainless steel seamless tubing having a stainless steel adjustable bullet shaped foot with a minimum of 1" of adjustment. Legs shall not be less than 6" high overall. Legs shall be welded to a 14 gauge die-formed stainless steel mounting plate. This plate shall telescope into a 14 gauge galvanized channel welded to the underside of the body. This channel shall extend the full length of the cabinet. The leg mounting plate shall slide in the channel to permit relocation and removal of the leg. The die forming plate shall have a center embossing for the 1-5/8" o.d. leg tubing and shall have a clinch nut inset screw for locking the leg in place.
- E. When to Omit Front Cross Rails:** Only where indicated, legs are to be without lower tubing cross-bracing in order to provide space for mobile item storage.
- F. Lower Shelves:** Where lower shelves are specified, these shelves shall be permanently welded to legs except when removable shelves are specified, and the stainless steel tubing cross rails will be omitted.
- G. Quantity:** Unless otherwise specified, tables and open base fixtures up to 6'-0" in length shall have four (4) legs. Tables from 6'-0" to 12'-0" in length shall have six (6) legs and tables from 12'-0" in length to 18'-0" in length shall have eight (8) legs or more as required to make a substantial fixture to accommodate special construction.

2.14 CABINETS - BASE UNITS; METAL CONSTRUCTION

- A. Construction Standards:** To be constructed to standards indicated in section 2.02 of these specifications. All casework to be stainless steel construction, unless otherwise noted.
- B. Countertops:** All countertops to be 14 gauge stainless steel, unless noted otherwise. Provide square rim edge, unless noted otherwise. 4" high splash at all back and side walls, unless noted otherwise. Countertops to be constructed to sizes and profiles shown on plans.
- C. Support:** All cabinets having a clear span below, shall be capable of sustaining a 300-pound load at the front edge of the counter at midspan.
- D. Base:** Cabinet bases shall be mounted on 12 gauge galvanized steel channel. All base cabinets shall have a 6" high toe space. The finish base applied thereto shall be the same base as in the rest of the room, and shall be applied thereto by that respective contractor, other than the Food Service Equipment Contractor).
- E. Legs:** Cabinet legs shall be of stainless steel with adjustable stainless steel feet, Welded to counter

support.

F. Hardware: The following hardware is specified to establish the desired design and level of quality. Alternative manufacturers of equivalent products may be used. Fabricator shall utilize the correct quantity and spacing of hardware items as recommended by the specific manufacturers:

1. Door Hinges: BLUM Premium Concealed Hinge, 125 degree opening, US26D finish.
2. Door Locks: HAFELE Inlaid Lock, US26D finish.
3. Door Catch: Adjustable heavy duty tension chrome plated catch, Component Hardware model M27-2490 or approved equal.. Provide non magnetic type.

G. Shelves: Provide shelving per section 2.16 of these specifications.

2.15 CABINETS - BASE UNITS; MILLWORK CONSTRUCTION

A. Construction Standards: All casework to be constructed to standard indicated in section 1.09-G of these specifications. All casework to be plastic laminate construction, unless otherwise noted. All plastic laminate cabinets are to be one color, unless otherwise noted. All cabinets shall utilize flush overlay construction.

B. Countertops: All countertops to be plastic laminate (different color from cabinets), unless noted otherwise. Provide 1-1/2" shelf edge, and 4" high splash at all back and side walls. All Corian to be FOUNTAINHEAD or Laminate to be FORMICA 2000 countertops to be constructed to sizes and profiles shown utilizing standard colors and finishes; provide fusion seaming.

C. Support: All cabinets having a clear span below, shall be capable of sustaining a 300-pound load at the front edge of the counter at midspan.

D. Base: All cabinet bases shall be mounted on 12 gauge galvanized steel channel. All base cabinets shall have a 6" high toe space. The finish base applied thereto shall be the same base as in the rest of the room, and shall be applied thereto by that respective contractor, other than the Food Service Equipment Contractor.

E. Hardware: The following casework hardware is specified to establish the desired design and level of quality. Alternative manufacturers of equivalent products may be used. Casework fabricator shall utilize the correct quantity and spacing of hardware items as recommended by the specific manufacturers:

1. Door Hinges: BLUM Premium Concealed Hinge, 125 degree opening, US26D finish.
2. Door Locks: HAFELE Inlaid Lock, US26D finish.
3. Adjustable Shelf Brackets and Standards: KV Recessed Pilaster and Supports, US26D finish.
4. Door Catch: Adjustable heavy duty tension chrome plated catch, Component Hardware model M27-2490 or approved equal.. Provide non magnetic type.

2.16 UNDERSHELVING (METAL)

If undershelving is not specified provide all tables, dishtables and sinks with tubular undershelves running the full length of unit.

- A. Stationary Shelving:** Stationary shelving under open base tables shall set approximately 8" above the floor with all edges rolled down on a 3/4" radius approximately 1-3/4". The profile of these shelves shall match metal edge profile No. 1. Where shelving intersects the leg, the joint shall be formed without openings. The shelving shall be attached by welding the underside. Where shelving abuts walls, turn edge up 2", round corners and finish smooth. Shelving shall be 16 gauge stainless steel.
- B. Removable shelving:** Removable shelving under open base tables will be supported on 1-1/4" stainless steel tubing. The resulting shelving shall be rolled down over the rails in maximum 20" wide sections. Where shelving abuts walls, turn edge up 2", round corners and finish smooth. Shelves shall be turned down 90° square where the resulting sections abut one another. Shelving shall be 18 gauge stainless steel.
- C. Tubular Shelves:** Tubular shelving under open base tables will be set approximately 8" above the floor on 6" centers, where shelving intersects the leg or a cross brace it shall be fully welded and polished smooth, the joint shall be formed without openings.
- D. Enclosed Shelving:** Enclosed cabinet shelving shall be of 18 gauge stainless steel, back and ends turned up 1-1/2" against body panels and spot welded. Front edge shall be turned down 1-1/2" and returned 1/2" on 75° angle on intermediate shelf. Lower shelf to be turned down 1-1/2" on front and back 11/16".
- E. Enclosed Shelving, Construction:** Enclosed cabinet removable shelving shall be made in maximum 20" wide sections having all edges flanged down 1-1/2". The corners of these shelves shall be left open so as to provide an easy to clean corner. Heated cabinet shelves shall be perforated with 1/2" diameter holes spaced on 3" centers. These shelves shall be removable and supported on angle framework as specified.
- F. Elevated Shelving:** Elevated Shelving 12" wide or less shall be of 16 gauge stainless steel or 14 gauge stainless steel in widths greater than 12". The front and ends shall be rolled down on a 3/4" radius - 1-1/2" diameter roll approximately 180°. This shall be metal edge profile No. 3. Where shelves are up against the wall or adjacent to fixtures, the edges shall be turned up 1-1/2". All flanges shall be coved on a minimum 1/8" radius with the intersecting turned up flanges at the back and ends also coved. The corners shall be welded, ground, and polished to form a fillet of the same radius as other bends.
- G. Table Mounted Shelves:** Table mounted shelves shall be supported from the top of the fixtures on 1-1/4" o.d. diameter stainless steel tubular uprights attached to the shelving with stainless steel feruled plates and/or stainless steel triangular brackets. The feruled plates shall be spot welded to the underside of the shelves and the stainless steel brackets shall be attached with stainless steel studs, lock washers, and acorn nuts. Tubular supports shall be attached to the counter top without

visible bolts and/or screws. It is extremely important that on dishtables the supports be located so as not to be placed in working areas. Supports on dishtables shall be extended through the return of the backsplash to a bracket below the working surface of the table. This bracket, whenever possible, shall be bracketed to an existing table leg.

2.17 WALL SHELVING

- A. Stainless Steel Wall Mounted Shelves:** Wall mounted shelves shall be supported on #14 gauge stainless steel cantilever type brackets. These brackets shall be steady and shall be provided with two holes for securely anchoring to the masonry at the job site. Triangular shapes brackets shall be attached to the underside of the shelf with studs, lock washers, and chrome plated acorn nuts.

2.18 PROTECTOR CASES

- A. Protector Cases:** Protector case shall be of the size shown on plan and shall be approved by Food Service Designs and Health Department codes and standards.
- B. Top shelf:** Top shelf shall be 16 gauge stainless steel serving shelf with the front being formed down on a slope to match the slope of the front glass and bracket. The rear and ends of the serving shelf to be turned down 1-3/4" on a 90° angle. The rear edge of the shelf shall be returned approximately 1". This channel shall form a housing for a built-in fluorescent light or heatlamp, where so specified. This channel shall accommodate Tombstone type fluorescent lamp holders which shall have the wiring completely enclosed and extended through tubular support into the base of the fixture, to a remote switch. All corners of the shelf shall be welded, ground, and polished smooth. The protector shelf shall be approximately 16" high
- C. Uprights:** Shelf shall be mounted on 16 gauge round stainless steel uprights unless otherwise specified. The uprights will be designed so as to be adjustable up-down 8", in a concealed manner without visible means of attachment.
- D. Glass units:** Provided with a removable polished stainless steel trim for holding the glass. This trim and bracket shall be provided with a cushioning material so as to prevent glass from cracking when it is being fastened in place. All exposed edges of the protector glass shall be trimmed with stainless steel channel. The bracket shall slope approximately 15° from vertical. Front glass to be 1/4" thick polished plate glass. The end of the protector shelf shall be enclosed with 1/4" thick polished plate glass having all exposed edges trimmed with stainless steel channel where specified. This trim is to be completely welded, with no rough or unpolished edges or seams.
- E. Lights:** Where lights are specified under the item, a base mounted switch will be provided. This switch shall be mounted in a recessed stainless steel pan, located on or in counter as directed by Food Service Designs. A ballast and ballast box shall be provided in the base of the counter as required.
- F. Heat Lamps:** Where heat lamps are specified under the item, remote infinite controls will be provided. These controls shall be mounted in a recessed stainless steel pan, located on or in counter as directed by Food Service Designs. A ballast and ballast box shall be provided in the base of the counter as required.

2.19 DRAWERS

- A. Construction:** All drawers shall be 18 gauge stainless steel body measuring 20" x 20" x 5" deep, or of size called for in Item Specifications.
- B. Insert:** Drawer pan insert shall be constructed of stainless steel and die-stamped with bottom corners rolled on a 1" radius and vertical corners rounded on a 2" radius, removable with-out the use of tools, measuring 20" x 20" x 5" deep, or of size called for in Item Specifications.
- C. Slides:** #14 gauge stainless steel channel type slides formed with nylon tired ball bearing rollers. Slide shall be of telescoping channels with a minimum of four rollers per pair. Slide shall be welded to the drawer face and cross bracing forming a cradle to accept the removable drawer body. This slide shall be pitched to allow the drawer to close via gravity. Complete drawer frame and slide assembly will be removable for cleaning.
- D. Fronts and pulls:** Fronts or Face shall be double pan construction shaped of #16 gauge stainless steel having all sides turned back with the corners welded. . The face shall be supplied with a stainless steel recessed grip with hand pull, chrome plated pull. Double panel faces will be sound deadened and insulated. Front shall be attached to drawer body with brackets.
- E. Locks:** Locks will be supplied as specified in item specifications. Locks shall be of sufficient strength to prevent unauthorized entry into the locked space. Locks shall be of the key and cylinder type with tamper-proof mechanisms. Furnish Owner with three (3) sets of keys to each lock at the conclusion of the project, accurately labeled and turned over to the Owner all at one point in time.
- F. Bumpers and Stops:** All drawers shall have rubber bumpers for quiet operation and shall have positive stops to prevent accidental withdrawal.

2.20 WORK TABLE TOPS - WOOD; CUTTING BOARDS

- A. Wood Work Table Tops:** Wood tops shall be of the highest quality northern grown hard rock maple. Thickness shall be as specified. Tops shall be constructed of selected strips of edge grain maple electronically bonded to exact dimension with one clear finely finished face. Hardwood curbs or riser to be supplied with 1" radius cove.
- B. Cutting Boards, "Richlite":** When "Richlite" cutting surfaces are specified, cutting boards will be N.S.F. approved phenolic fiber laminate tops under the trademark "Richlite." Coved risers are ½" thick with a ½" radius cove. Standard height of risers is 4".
- C. Cutting Boards:** N.S.F approved thermoplastic tops and cutting boards can be used in areas where cutting or carving surfaces are required. Material shall not warp, crack, bend, chip or peel. Material shall be high density polyethylene; pure natural polypropylene; copolymer natural polypropylene. Material shall be acceptable to N.S.F., U.S.D.A & F.D.A. specifications.

2.21 REFRIGERATED BASES

- A. Controls:** F.E.C. shall provide all switches, controls, valves, thermostats and all necessary hardware for a complete system.

2.22 FOOD WARMERS AND PLATE SHELF

- A. Heating Wells:** Electric food warmers consist of the number of wells as shown on plan. Heating wells shall be of one piece die-stamped heavy gauge type 302 stainless steel. Wells shall be heated with 1600 watt stainless steel heating element connected to a thermostat equipped with an off position. Each well shall have a pilot light indication when the well is on. Food warmers shall be installed the counter top having a die-formed headed edge which shall flange down into the food well and be attached with stainless steel flat head screws. The joint between the counter top and the food well shall be sealed with high temperature sealastic to prevent any escape of vapors.
- B. Food Well Controls:** Food well controls shall be mounted on the operator's side of the counter or shall be mounted in a stainless steel recessed panel below the plate shelf as required per item specifications. Food warmers are to be supplied in 115-208-230 volt electrical characteristics. Food wells are to be completely interwired terminating in two or three leads. Wire sizes shall be as specified and required under the National Electric Code.
- C. Plate Shelf:** Plate shelf: Each food warmer, where required, shall be stainless steel with a dish shelf mounted to the rear of the food wells and below counter top. This shelf shall be fabricated of #16 gauge stainless steel and shall be approximately 9-1/2" wide front to back. This dish shelf shall be so formed in contour as per detail drawing providing apron for mounting of food well controls and pilots. The plate shelf will also provide a necessary electrical chase for all wiring. Note: If counter containing food wells is to be constructed so that dish carts will roll underneath, shelf is not to be constructed unless specified, and then constructed in such a manner so as not to interfere with the dish cart passage.
- D. Drain Valve:** All drain valves are to be mounted in a stainless steel recessed pan mounted in the apron of the counter.

2.23 COLD PANS

- A. Non- Refrigerated Cold Pans:** Shall be of the size shown on drawing. Cold pans shall have an interior liner of 20 gauge polished stainless steel having all interior corners coved on a minimum 1/4" radius. The exterior of the cold pan shall be constructed of 18 gauge stainless steel. The bottom of the interior pan shall be creased to 1" chrome plated drain. The bottom and sides of the cold pan shall be provided with a minimum of 2" foamed-in-place insulation. The foam insulation shall have a 1.9 pound density and shall have a "K" factor of .12. Where the counter top is turned down into the cold pan, the metal contact shall be broken with breaker strips. Provide cold pan with 1" condensate drain.
- B. Refrigerated Cold Pan:** Refrigerated cold pan shall be constructed as outlined above having stainless steel interior pan covered with 3/8" o.d. copper refrigeration coils in a serpentine pattern approximately 2" o.d. fastened to the underside of the inner liner for mechanical refrigeration. These

coils shall be die-formed and shaped so as to provide good contact between the copper coil and the stainless steel liner. A conductive mastic will be applied between the coils and the liner so as to insure uniform transfer of heat from the pan to the coil. The exterior of the pan will be provided with a valve box for cold pan expansion valve. Extend coil leads to the refrigeration condensing unit. Cold pan controls are to be mounted in a recessed stainless steel pan mounted where shown on plans or stated in the item specifications. Provide cold pan with 1" condensate drain.

2.24 WALK-IN REFRIGERATORS AND FREEZERS

- A. Condensation drains:** Drain lines shall have a trap to prevent humidity from entering unit.
- B. Freezer Compartments:** Any drain lines located in freezer compartments shall be fully insulated and wrapped with heat tape to prevent condensation from freezing.

END OF GENERAL SECTION

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2.25 ITEM SPECIFICATIONS

ITEMS BELOW FOR TOWER HIGH SCHOOL – TITAN EXPRESS / SHEETS FSE1-3

ITEM 1

Milk Cooler - Relocate/Existing

QUANTITY: One (1)

MANUFACTURER: Beverage Air

FEATURES: 1) F.E.C. to relocate existing unit(s) per General Standards section 1.11.
2) F.E.C. shall clean and inspect unit.

ALTERNATES: None

ITEM 2

Reach-In Freezer - Relocate/Existing

QUANTITY: One (1)

FEATURES: 1) F.E.C. to relocate existing unit(s) per General Standards section 1.11.
2) F.E.C. shall clean and inspect unit.

ALTERNATES: None

ITEM 3

Reach-In Refrigerator - Relocate/Existing

QUANTITY: One (1)

FEATURES: 1) F.E.C. to relocate existing unit(s) per General Standards section 1.11.
2) F.E.C. shall clean and inspect unit.

ALTERNATES: None

ITEM 4

Storage Shelving - Existing

QUANTITY: One (1) Lot

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FEATURES: 1) Existing to remain as is.

ALTERNATES: None

ITEM 5

Hot Cabinet

QUANTITY: One (1)

MANUFACTURER: Cres-Cor (Cleveland, OH)

MODEL: H-137-SUA-12D

FEATURES: 1) All insulated stainless steel construction with 16 gauge stainless steel welded cabinet frame and doors.
2) 1500 watt heating system with exterior thermometer.
3) 5" diameter swivel neoprene casters with brakes.
4) Adjustable universal angle pan slides.
5) Provide with 6'-0" long cord and plug.
6) Self closing dutch doors.

ALTERNATES: None

ITEM 6

Spare Number

ITEM 7

3 Compartment Sink

QUANTITY: One (1)

MANUFACTURER: Advance/Tabco or Approved Fabricator

MODEL: K7-CS-32

FEATURES: 1) Provide all stainless steel construction.
2) Provide with lever handle drain.
3) Stainless steel adjustable feet and leg gussets.
4) All welded drainboards. Drainboards and sink must slope to drain so that no

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water pools.

- 5) Provide Krowne swing spout backsplash mounted faucet with 12" swing spout.. Provide rotary wastes with connected chrome tailpiece and overflow. Provide stainless steel mounting clip for each rotary waste valve.
- 6) F.E.C. is to coordinate location of Grease Trap with M.C. Grease trap is to be easily accessible for cleaning and maintenance.
- 7) Provide 18 gauge stainless steel wall panel on wall the entire length of potsink, 24" above backsplash. Wall paneling shall be joined together with t-strips and sealed with silicone caulk.

ALTERNATE: None

ITEM 8

Worktable

QUANTITY: One (1)

MANUFACTURER: Duke or Approved Fabricator

MODEL: 314S-36-48-2R Modified with 2" turn-up across back and both ends.

- FEATURES:
- 1) Size and shape per plan.
 - 2) Construct per details and General Standards. Construct entirely of stainless steel; top shall be 14 gauge.
 - 3) Sound deadening per General Standards.
 - 4) Stainless steel 1-5/8" diameter legs, leg gussets and 5" caster; (2) locking
 - 5) Provide stainless steel 16 gauge undershelf. Provide 6" high clearance under undershelving.

ALTERNATES: None

ITEM 9

Hot Sandwich Slide

QUANTITY: One (1)

MANUFACTURER: Hatco (Milwaukee, WI)

MODEL: GR3SDS-33D

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- FEATURES:
- 1) Indicating temperature control.
 - 2) Rubber feet, no legs.
 - 3) Provide with display sign holders for each shelf.
 - 4) Provide 6'-0" long cord and plug.

ALTERNATES: None

ITEM 10

Display Refrigerator

QUANTITY: One (1)

MANUFACTURER: True Mfg. or Beverage Air

MODEL: GDM-41-HC-LD

- FEATURES:
- 1) Black exterior finish.
 - 2) Self contained refrigeration system.
 - 3) Glass door(s) with locks.
 - 4) Casters, two (2) with brakes.
 - 5) Provide 6'-0' long cord and plug.

ALTERNATES: None

ITEM 12

Mobile Snack Rack – By Owner

ITEM 13

Worktable

QUANTITY: One (1)

MANUFACTURER: Duke or Approved Fabricator

MODEL: 314S-2436-2R

- FEATURES:
- 1) Size and shape per plan.
 - 2) Construct per details and General Standards. Construct entirely of stainless steel; top shall be 14 gauge.

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- 3) Sound deadening per General Standards.
- 4) Stainless steel 1-5/8" diameter legs, leg gussets and adjustable feet.
- 5) Provide 2" turn-up on rear.
- 6) Provide stainless steel 16 gauge undershelf. Provide 6" high clearance under undershelving.

ALTERNATES: None

ITEM 14

Storage Shelving

QUANTITY: One (1)

MANUFACTURER: Quantum

MODEL: Millenia

- FEATURES:
- 1) Plastic construction; 4 tiers. 74" Posts
 - 2) Adjustable feet.
 - 3) Assemble and install racks, making certain that rack shelving does not interfere with door swings, lighting or drains.

ALTERNATES: None

ITEM 15

Pretzel Cabinet - Relocate/Existing

QUANTITY: One (1)

- FEATURES:
- 1) F.E.C. to relocate existing unit(s) per General Standards section 1.11.
 - 2) F.E.C. shall clean and inspect unit.

ALTERNATES: None

ITEM 16

Beverage Dispenser – By Owner

ITEM 17

Worktop Refrigerator

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QUANTITY: One (1)

MANUFACTURER: Continental

MODEL: RA60SNBS Compressor right side

FEATURES: 1) Self-contained refrigeration system.
2) Stainless steel feet.

ALTERNATES: None

ITEM 18

Cup Dispenser – By Owner

ITEM 19

Spare Number

ITEM 20

Ice Maker - Relocate/Existing

QUANTITY: One (1)

FEATURES: 1) F.E.C. to relocate existing unit(s) per General Standards section 1.11.
2) F.E.C. shall clean and inspect unit.

ALTERNATES: None

ITEM 21

Coffee Maker – By Owner

ITEM 22

Toppings Rail – By Owner

ITEM 23

Slushie Machines

QUANTITY: Two (2)

MANUFACTURER: Bunn

MODEL: Ultra NX BLK/SST

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- FEATURES:
- 1) 2 flavor dispenser. Top fill reservoir.
 - 2) Removable drip trough.
 - 3) Stainless steel construction.
 - 4) Provide 6'-0" long cord and plug.

ALTERNATES: None

ITEM 24

Glass Protector Panel

QUANTITY: One (1)

MANUFACTURER: PMG Glass

MODEL: Custom

- FEATURES:
- 1) Provide glass flat panels, frosted with owner's logo in long side glass.
 - 2) Provide brushed stainless steel finish with narrow flanged feet.
 - 3) Mount to counter as shown.

ALTERNATES: None

ITEM 25

P.O.S. Terminal – By Owner

ITEM 26

Serving Counter w/Pass-Thru Ledge

QUANTITY: One (1)

MANUFACTURER: Approved Fabricator

- FEATURES:
- 1) Construct per details and General Standards. Counter and pass-thru to be constructed to support the counter equipment and 300 pounds of live weight at any point.
 - 2) 14 gauge stainless steel top.
 - 3) Provide stainless steel construction
 - 4) Support on 6" high stainless steel adjustable legs with removable kickplates.

- 5) Provide bottom shelf only
- 6) Provide 2" high single thickness endsplashes where counter meets wall(s). Seal to wall with silicone caulk, taking care to tape seams before applying caulk. Sealing gaps greater than 1/8" will not be acceptable.
- 7) E.C. to provide and install all wire, conduit, receptacles and make final connections.
- 8) Provide openings with grommets in top for cords and any water lines needed.
- 9) F.E.C. is to coordinate roll down shutter door with trades. Shutter track is to be incorporated into counter for a clean look. Shutter is not to interfere with protector cases or counter equipment.

ALTERNATES: None

ITEM 27

Yogurt Machine - Relocate/Existing

QUANTITY: One (1)

- FEATURES:
- 1) F.E.C. to relocate existing unit(s) per General Standards section 1.11.
 - 2) F.E.C. shall clean and inspect unit.

ALTERNATES: None

ITEM 28

Worktable

QUANTITY: One (1)

MANUFACTURER: Duke or Approved Fabricator

MODEL: 314S-2436-2R

- FEATURES:
- 1) Size and shape per plan.
 - 2) Construct per details and General Standards. Construct entirely of stainless steel; top shall be 14 gauge.
 - 3) Sound deadening per General Standards.
 - 4) Stainless steel 1-5/8" diameter legs, leg gussets and adjustable feet.
 - 5) Provide 2" turn-up on rear.

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- 6) Provide stainless steel 16 gauge undershelf. Provide 6" high clearance under undershelving.

ALTERNATES: None

ITEM 29

Handsink w/Electronic Faucet

QUANTITY: One (1)

MANUFACTURER: Krowne

MODEL: HS-70

- FEATURES:
- 1) All stainless steel construction. Fully welded.
 - 2) Provide electronic, battery powered faucet.
 - 3) Provide chrome plated drain and P-Trap.
 - 4) Provide all necessary mounting hardware.
 - 5) Owner to provide soap and towel dispenser for each sink.

ALTERNATES: None

ITEM BELOW FOR HAWTHORNE WALK-IN REPLACEMENT SHEET FSE-4

ITEM H1

Walk-In Refrigerator/Freezer – 7'-5" High

QUANTITY: One (1)

MANUFACTURER: Imperial Brown

MODEL: Custom per plan & specification. With 4" insulated screeds with tapcon fasteners, mounted on built-in insulated quarry tile floor (by others).

- FEATURES:
- 1) All exposed exterior panels are to be stainless steel.
Unexposed exterior panels are to be stucco-embossed galvalume.
Door frames and doors to be stainless steel and have 36" diamond treadplate on interior and exterior.
Doors to have 14"x14" heated view window.

Interior to be "white" stucco-embossed aluminum.

Trim strips and closure panels to match exterior panels (Foodservice Equipment Contractor to verify size).

- 2) Panels: Panels shall be fastened with cam-locking devices. Insulation shall be 4" thick foamed-in-place polyurethane Class 1 UL foam, R value to exceed R-32, flame spread 25 and certified to meet NSF and FM standards.
- 3) Doors: "R" series doors, delete plastic bumpers. Doors, frames, and door panels shall be stainless steel, front and back and have an R value that exceeds R-32. Hinges shall be cam-lift; chrome plated; three (3) hinges per door. Door swings as shown on plan. Cover both sides of all doors with 1/8" thick aluminum diamond tread plate to bottom of latch. Provide a view port window in doors, heated in low temp applications. Fiberglass Reinforced Plastic door jambs to have low wattage anti-condensate perimeter heater. Provide concealed locking bar (Note: not a locking bar.) Provide clear thermal curtain for each door. Provide with digital type thermometer mounted on face. Provide stainless steel threshold for all door(s).
- 4) Provide with LED lights with plastic shields, quantity as shown on electrical drawing. Conduit runs inside the Walk-In are not acceptable. All penetrations through walls and ceiling shall be sealed with foam and caulked.
- 5) Self support ceiling/suspended ceiling hangers; do not support from inside of Walk-In for indoor applications. When Walk-In is located outdoors manufacture will provide posts and beams (as required). Posts and beams shall be painted white with two coats of epoxy paint. Provide with rubber roof cap and all mounting hardware required for a proper installation. Walk-In roof to be properly supported to maintain the snow loads as required by local, state and national codes based on final location. Manufacturer to provide written certification by structural engineer. Flashing to building walls shall be by others, N.I.F.E.C.
- 6) Condensing Units: All compressors to be Heatcraft pre-assembled remote systems with "**Intelligen**" controls, UL listed, properly sized and use ECM motors per the U.S. Energy Independence & Security Act of 2007. Provide vibration eliminators and all necessary parts for a complete installation. Provide medium temperature defrost timers and low temperature defrost timers, factory mounted and wired to the condenser unit. Provide galvanized compressor housing(s) with louvers. Compressor(s) locations to be determined by architect.

Air cooled, outdoor: Each system is to be provided with; required thermal expansion valves, crankcase heater, low ambient controls, solenoid valve,

temperature control, filter/drier, sight glass and a headmaster control with the exception of control wiring and fused disconnects

Refrigerator: hermetically sealed

Freezer: hermetically sealed

- 7) Evaporator Coils: Evaporators shall be ceiling mounted and UL listed and use ECM motors per the U.S. Energy Independence & Security Act of 2007. Evaporator Coil(s) to be located where shown on drawings.
- 8) Refrigerant shall be R448A for refrigerators and freezers. Refrigeration system(s) shall be installed to highest standards of quality and performance. Installation shall be in accordance with all applicable codes and regulations.
- 9) Refrigerant lines will be fully insulated by Foodservice Equipment Contractor with Armstrong "Armaflex" tubing between evaporator and compressor. Refrigeration lines will be "trapped" where necessary. All penetrations through walls and ceiling shall be sealed with foam and caulked by F.E.C.
- 10) F.E.C. shall make certain that refrigeration supplied for this item is of sufficient capacity to maintain refrigerators at +35° Fahrenheit and freezer at -10° Fahrenheit in moderate to high use conditions. Manufacturer must meet temperature performance guidelines.
- 11) Foodservice Equipment Contractor shall provide and connect all components, as recommended by manufacturer. Foodservice Equipment Contractor to coordinate installation of this item with Other Contractors. F.E.C. to provide start-up and adjustment per manufacturer's specifications 48 hours prior to date of completion.
- 12) F.E.C. is to provide an additional 4 year parts and labor warranty on all compressors. Wall, floor and roof panels shall have a 10 year warranty.
- 13) F.E.C. will assemble and locate walk-in where shown on plan. F.E.C. is to caulk the bottom only of all vinyl floor screeds at installation.
- 14) F.E.C. shall plumb drain lines from evaporators to floor drains as shown on drawings. Drain lines shall be fully installed. F.E.C. is to provide heated drain lines in freezers. F.E.C. shall trap and provide proper air gapped drain line. All penetrations through walls and ceiling shall be sealed with foam and caulked by F.E.C.
- 15) E.C. to provide and install disconnects for each compressor.
- 16) Provide built-in alarm for each compartment.

ALTERNATES: Provide 48" high diamond treadplate around perimeter of interior.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify Project Conditions:** The Foodservice Equipment Contractor, before beginning his work, shall examine the space and existing conditions, and shall report to Food Service Designs any conditions which prevents him from executing his work as required under the contract.
- B. Take Field Dimensions:** The F.E.C. shall take all field dimensions and shall be responsible thereafter.
- C. Coordinate with Other Trades:** The F.E.C. shall coordinate the locations of chases, grease traps, troughs, floor recesses, roll-up doors and passage ways to insure that the locations are correct and not conflicting with equipment, columns, footings, equipment bases, legs, et cetera.
- D. Verify Installation:** The F.E.C. shall verify that products furnished under this Section for installation and under another Specification section have been correctly installed.
1. F.E.C. is solely responsible for delivering the food service equipment. The F.E.C. shall visit the site to insure that large pieces of equipment will fit through doors, into elevators, down steps, et cetera.
 2. F.E.C. shall make certain that all equipment is delivered to the site in time to fit through access passages to their final locations.
- E. Coordinate Counter Detailing:** In detailing fixtures, the F.E.C. shall consult with piping contractors to be certain that due space allowance is made for traps and other controls, particularly under lower shelves of cabinets and counters.
- F. Walk-in Refrigeration:** The F.E.C. shall verify the size of the space allocated for walk-in cooler and freezer units. If a recessed floor is being used, verify the size and slope of the recess. Floor is to be level. Do not proceed if conditions are unsatisfactory for a proper installation. Follow manufacturer's recommendations in determining relevant requirements. F.E.C. shall make certain that refrigeration systems supplied is of sufficient capacities to maintain proper temperatures.
- G. Base and Curb Dimensions:** F.E.C. shall measure to verify that curbs and bases are level, properly sized and correctly located. Do not proceed if conditions are unsatisfactory.
- H. Utility Rough-In Points:** F.E.C. shall measure to determine the precise location of utility rough-in points; verify against plans and drawings. Revise shop drawings to show actual locations of utility services.
- I. Timing of Examinations:** F.E.C. shall examine field conditions in a timely manner, so as not to impede the progress of the project. Perform on-site inspection of utilities as they are roughed-in to make certain that specified locations are appropriate and in keeping with the design. This inspection shall be made before floors are poured or walls covered. The F.E.C. shall be responsible thereafter.

- J. Equipment Operations:** F.E.C. will make certain that all equipment specified will operate in the correct direction. If any piece of equipment will not function correctly where drawn, the F.E.C. will be responsible for advising Food Service Designs of the conflict. The F.E.C. has final responsibility for making certain that the equipment will function in the direction intended.

3.02 INSTALLATION

- A. Notice to Proper Authorities:** Foodservice Equipment Contractor, at such time so as not to impede the progress of the project, shall give to the proper authorities all notices as required by law relative to the work in his charge including the Public Health Department or State Regulatory Agencies, and State Fire Marshal; obtain all official permits, licenses, et cetera, and pay such proper and legal fees to public officers and others as may be necessary for the faithful performance of the work.
- B. Sealing, Closed Bases:** Certain fixtures and counters will have closed bases. The Foodservice Equipment Contractor shall erect these items, using approved mastic or silicone compound to effectively seal out all space for vermin and eliminate spaces for water to stand.
1. Openings for pipes in walls or bottom of food compartments shall be tightly sealed against the entry of vermin.
 2. Reinforcing and framing members that are not totally enclosed or within walls are to be used in such a manner as to be easily cleanable.
 3. All framing members shall be constructed and installed so as to eliminate raceways, for harboring of vermin.
 4. The ends of all hollow sections shall be sealed.
 5. Where fixed panels are applied to the outside or inside or set into an angle or other reinforced body or counter frame, the method of fastening shall be such as to minimize projections and openings.
- C. Access Panels:** Access panels are to be used for access to drains and junction boxes **ONLY**. They are used for cleaning drains and accessing the junction boxes. They are not to be used for any plumbing or electrical chases. The plumbing and electrical lines shall be drilled or punched through sides, tops, shelves and bottom of counters and cabinets. These holes will be the same diameter as the pipe or conduit and sealed with silicone. The penetrations shall be made as far back and off to the sides as possible. Piping shall not interfere with the operation of equipment or storage of product. All piping shall be secured in-place.
- D. Set in Place:** Set each item of non-mobile and non-portable equipment securely in place; level and adjust to correct height.
- E. Support Equipment:** Anchor equipment to supporting substrate where indicated or where needed for sustained operation and use without shifting or dislocation. Conceal anchorages where possible.

- F. Anchors and Chair Carriers:** Where indicated or needed for safety of equipment operator, anchor equipment to floor or wall with stainless steel screws or bolts.
- G. Coordination with Other Trades:** Deliver to other contractors all loose plumbing parts; floor troughs, steam fitting, ventilation and electrical parts that are a part of the equipment or the work under this contract, or required for their proper installation, and give instructions for their proper installation of each item.
- H. Level Counters and Tables:** Adjust counter tops and other work surfaces to level tolerance of 1/16 inch maximum offset, and maximum variation from level or indicated slope of 1/16 inch per four (4) foot.
- I. Field Joints:** Complete field-assembly joints in work (joints which cannot be completed in shop) by welding, bolting-and-gasketing, or similar methods as required. Set or trim gaskets flush, except for "T" gaskets as indicated. Field joints in fabricated equipment shall be welded, and work surfaces ground and polished on premises, so that upon completion each item of equipment will have true, smooth and even surfaces. Filling with solder is not permitted.
- J. Connected Equipment:** As distinct from field joints, where a single item of equipment must be shipped and brought into the project site in two or more sections that are welded into one unit, there are instances when two separate pieces of equipment are to be connected. For example, a dishwashing machine and the clean dishtable need to be attached. The F.E.C. shall make these connections rigid and strong by bolting the units together and sealing the joint with minimal amounts silicone caulking. Under no circumstances shall caulking alone, or excessive caulking to fill voids, be acceptable. Joints are to be watertight.
- K. Enclosed Spaces:** Treat spaces that shall be inaccessible after equipment installation, by covering horizontal surfaces with powdered borax at rate of 4 ounces per square foot.
- L. Closure Plates and Strips:** Install where required, with joints coordinated with units of equipment.
- M. Cut-Outs:** The F.E.C. shall provide cut-outs in Foodservice equipment where needed to run soda, plumbing, electric, gas, or steam lines through equipment items for final connections. These cutouts are to be made at the factory when possible. If a field cut-out is required it will be made just large enough for the piping and in a concealed location. All cut-outs will be sealed and vermin proof. F.E.C. shall provide rubber grommets where electrical cords penetrate metal.
- N. Sealants and Gaskets:** Install all around each unit to make joints air-tight, watertight, vermin-proof, and sanitary for cleaning purposes. Where necessary, use backer rod to shape sealant bead properly, at 1/4 inch depth. Shape exposed surfaces of sealant slightly concave, with edges flush with faces of materials at joint. At internal-corner joints, apply sealant or gaskets to form a sanitary cove, of not less than 3/8 inch radius.
- O. Existing/Relocated Equipment:** F.E.C. shall remove existing/relocated equipment from storage and set in place. Final connections shall be by other trades. Test each existing item for proper

operation, and deliver to Owner in proper working condition or in specified condition.

- P. Refrigeration Lines:** F.E.C. shall connect refrigeration lines from all evaporator coils to condensing units. F.E.C. is to locate; refrigerant lines, evaporator coils, condensing units and all necessary components. All penetrations shall be sealed.
- Q. Existing Refrigeration Removal:** Existing refrigeration equipment that is not scheduled to be reused shall be removed and disposed of properly by the F.E.C. The F.E.C. shall capture refrigerant and dispose of in a lawful manner.

3.03 FIELD QUALITY CONTROL

- A. Supervision:** Foodservice Equipment Contractor is to provide a competent field supervisor during the installation of this part of the Work.
1. The field supervisor shall attend scheduled progress meetings.
 2. The field supervisor shall supervise the installation of the equipment and connections and will counsel with other contractors in regard to those connections and installation.
 3. This representative will work closely with the site supervisor of the Owner; and will establish with the site supervisor of the Owner his schedule of Foodservice equipment installation that will be satisfactory to all contractors affected by his work; a copy of this schedule sent, within two (2) weeks of contract award, to Food Service Designs.
 4. If the F.E.C. falls behind in the performance of his work, as determined by Food Service Designs, the F.E.C. supervisor will perform his work according to the priorities established by the Owner.
 5. The F.E.C. supervisor shall instruct the operators of each piece of equipment in its proper use; training to the satisfaction of Owner; repeat visits to the site may be required and should be anticipated.
- B. Weather, Labor Issues, etc.:** Foodservice Equipment Contractor is cautioned to anticipate the required work required for this project. Consideration should be given to weather, labor issues, factory production schedules, and other issues relating to the performance of his work or work under the Foodservice Equipment contract. No additional monies will be paid for delayed work resulting from the Foodservice Equipment Contractor's failure to anticipate the scope of the work required for this project.
- C. Equipment Fit:** The Foodservice Equipment Contractor will make certain that all equipment specified will fit into the spaces provided. If any piece of equipment will not fit where drawn, the F.E.C. will be responsible for advising Food Service Designs of the conflict. The Foodservice Equipment Contractor has final responsibility for making certain that equipment will fit as shown and specified.
1. Where racks or storage shelving are specified to be a certain length, height, and width, the

Foodservice Equipment Contractor will verify that the specified racks will fit as shown and specified, and will not interfere with plumbing lines, evaporators, electric conduit or other obstructions to the placement of the rack as shown.

2. Should the F.E.C. find that any item may not fit as drawn, he must send a letter to Food Service Designs describing the situation and the proposed solution. Verbal communication does not constitute adequate notification of said problem.

D. Installation: The Foodservice Equipment Contractor shall install the equipment at the site in full compliance with all applicable codes, rules and regulations of the Local, State, and Federal governing agencies. If, because of jurisdictional trade agreements or other conditions, any work specified to be performed under this contract must be done by others, the Foodservice Equipment Contractor shall sub-let such work to those who may be qualified to do such work or make other arrangements at his own expense as may be approved by Food Service Designs.

E. Delivery of Fabricated items: If it becomes necessary to schedule construction so that all partitions will be erected prior to the delivery of the Foodservice Equipment, bidders are cautioned that all equipment must be fabricated so that it can be handled through finished door openings.

It is recommended that the F.E.C. document the condition of the fabricated equipment upon installation at the site with detailed photographs. If photographs are to be used, they must be taken after installation with color film. One (1) set each of the photographs should be forwarded to Food Service Designs and the Owner for record. The photographs will be accepted by Food Service Designs as a record of the condition of the equipment at installation and may be used to assign responsibility when damages are noted in site inspections.

F. Inspections by Regulatory Authorities: The authorized representative of State and Local municipal inspectors and/or Food Service Designs shall have access to the work at all times wherever it is in progress or preparation. The Foodservice Equipment Contractor shall arrange a convenient time and access for such inspection.

G. Inspection By Food Service Designs: Food Service Designs shall have free access to the Foodservice Equipment Contractor's shop or shops during the construction of this equipment for the purpose of making inspections to see that plans, specifications and detail drawings are being adhered to carefully. The Foodservice Equipment Contractor shall correct any errors found during these inspections to the extent and within the scope of the plans, specifications, detail drawings, and within the conditions of this contract.

H. Condemnation Procedures: Material delivered to the site shall be carefully inspected by the Foodservice Equipment Contractor shall, within 24 hours after receiving written notice from Food Service Designs to that effect, proceed to remove from the grounds or building all materials, fixtures, or apparatus condemned by Food Service Designs whether the same shall be worked or un-worked, or take down and remove all portions of the work which Food Service Designs shall deem as failing to conform to the drawings and specifications and to the conditions of the contract.

3.04 TESTING

A. Testing: Delay start-up of food service equipment until service lines have been tested, balanced, and adjusted for pressure, voltage, and similar considerations; and until water and steam lines have been cleaned and treated for sanitation. Before testing, lubricate each equipment item in accordance with manufacturer's recommendations. Testing shall be performed by a certified service agency.

1. Test each item of operational equipment to establish that it is operating properly, and that controls and safety devices are functioning.
2. Replace equipment or components of equipment which are found to be defective in its operation, including units which are below capacity or operating with excessive noise or vibration.

3.05 CLEANING

A. Cleaning During Project Progress: Clean up all debris made by F.E.C. personnel as work progresses, leaving all work spaces as clear as reasonable. At the close of each work day, secure the work site so to prevent injury or accident to others. The Foodservice Equipment Contractor will be responsible for injuries resulting from failure to secure the work environment.

B. Remove Coverings and Clean: After completion of installation and completion of other major work in food service areas, remove protective coverings and clean food service equipment internally and externally.

C. Restore Damaged Finishes: Restore exposed and semi-exposed finishes to remove abrasions and other damages; polish exposed-metal surfaces and touch-up painted surfaces. Replace work which cannot be successfully restored.

D. Final Cleaning: After testing and start-up, and before the time of Substantial Completion, clean and sanitize Foodservice equipment, and leave in condition ready for use in Foodservice. The F.E.C. shall contact the Owner to visually inspect the cleaned Foodservice equipment, and shall have the Owner sign a statement prepared by the F.E.C. A copy of the signed statement will be sent to Food Service Designs. If the F.E.C. fails to provide a copy with the Owners signature, the equipment will be cleaned again, until an Owners signed copy is received.

3.06 DEMONSTRATION AND TRAINING

A. Demonstration: In the presence of the foodservice staff, demonstrate that each item functions as specified.

B. Instruction: Provide comprehensive on-site instruction in the proper operation and typical use of each piece of equipment. Instruction shall be provided to the Owner or designated person(s) at or near a date set by owner at the completion of this project. Instruction shall be to the satisfaction of the Owner. Repeat visits to the site may be required and should be anticipated.

3.07 WARRANTIES AND GUARANTEES

A. Period of Guarantee and Remedies: The Foodservice Equipment Contractor shall guarantee

materials and workmanship for a period of 12 months from the date of acceptance by the Owner and shall leave the work in perfect order at completion. Should defects develop within the guarantee period, the Foodservice Equipment Contractor shall, upon written notice of same, remedy the defects and reimburse the Owner for all damage to the other work, whether caused by the defects or by the work of correcting the defects. Guarantee shall cover all labor, parts travel and incidental expense.

1. All equipment for a period of 12 months.
2. All refrigerator compressors shall be for 5 years.

B. Performance Bond and the Guarantee: Performance Bond will be furnished if required by the Owner and shall be a part of this contract shall remain in effect until the expiration of the guarantee period as assurance of the Foodservice Equipment Contractor's obligation to fulfill this stipulation.

C. Guarantees Extending Beyond Eighteen Months: Guarantees, if any, extending beyond said one year period shall be specifically indicated in the Specifications, and may be fulfilled by the assignment of the bond or written warranty of the manufacturer.

3.08 PUNCH LIST

A. Pre-Punch List: The Foodservice Equipment Contractor shall prepare an internal punch list and complete said list prior to completion of the project. This shall be done to minimize the final punch list and the time to complete the final punch list. Should defects arise F.E.C. shall repair, replace, or notify proper authorities. Under no circumstances shall the F.E.C. not inform or repair any defects found in there internal punch list.

B. Punch List: Food Service Designs shall visit the project to prepare a punch list of the Foodservice Equipment Contractor's installation. Food Service Designs must prepare a punch list prior to the Health Department site inspection. The F.E.C. is responsible for notifying Food Service Designs.

C. Final Punch List: The Food service Equipment Contractor shall complete all punch lists in a timely manner acceptable to the Owner. When complete, F.E.C. shall contact Food Service Designs in writing, to inspect that all work is completed. If Food Service Designs is required to make additional trips to the site after final inspection the F.E.C. will pay all costs incurred for each additional visit.

3.09 FINAL SUBMITTAL

A. Final Submittal: The Food Service Equipment Contractor shall submit to the Owner in a timely manner prior to opening the facility, all final submittal listed below. These shall be submitted in one (1) package at one time.

1. Three (3) operation and maintenance manuals, per section 1.07.
2. All keys, three (3) for each lock and each key labeled.
3. Three (3) copies of every drawing (as built), this includes all shop drawings, and rough-in drawings.

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4. Three (3) additional copies of the buy-out brochure (as built).

3.10 CLARIFICATION

- A. Questions:** Questions concerning the Foodservice equipment and these specifications, either before bidding or after the award of the Foodservice equipment contract should be addressed to:

Food Service Designs, LLC

9201 Funston St.

White Lake, Michigan 48386

(248) 410-3459

- B. Discrepancies:** It is intended that the F.E.C. will provide the work described in the Foodservice documents for this project, and shown on Foodservice drawings. Where there is a discrepancy between the drawings and the written documents, the F.E.C. will provide, item for item, those items that are indicated on one, but not the other. For example, a table will be provided if shown on plan but not indicated in written specifications. The F.E.C. shall provide the greater of the two, unless noted on the bid form. No additional monies will be granted to the F.E.C. if they fail to note the discrepancies on the bid form.
- C. Interpretations:** Final binding interpretations regarding Foodservice work contained in the Foodservice bid documents and subsequent contract will be the responsibility of Food Service Designs.

END OF FOOD SERVICE SECTION

**SECTION 210500
COMMON WORK RESULTS FOR FIRE SUPPRESSION**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Pipe, fittings, sleeves, escutcheons, seals, and connections for sprinkler systems.
- B. Incoming fire service backflow preventer.

1.02 RELATED REQUIREMENTS

- A. Section 07 8400 - Firestopping.
- B. Section 09 9123 - Interior Painting: Preparation and painting of interior fire protection piping systems.
- C. Section 21 0523 - General-Duty Valves for Water-Based Fire-Suppression Piping.
- D. Section 21 0553 - Identification for Fire Suppression Piping and Equipment: Piping identification.
- E. Section 21 1200 - Fire-Suppression Standpipes: Standpipe design.
- F. Section 21 1300 - Fire-Suppression Sprinkler Systems: Sprinkler systems design.

1.03 REFERENCE STANDARDS

- A. ASME A112.18.1 - Plumbing Supply Fittings 2018, with Errata.
- B. ASME BPVC-IX - Qualification Standard for Welding, Brazing, and Fusing Procedures; Welders; Brazers; and Welding, Brazing, and Fusing Operators - Welding Brazing and Fusing Qualifications 2019.
- C. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250 2015.
- D. ASME B16.3 - Malleable Iron Threaded Fittings: Classes 150 and 300 2016.
- E. ASME B16.4 - Gray Iron Threaded Fittings: Classes 125 and 250 2016.
- F. ASME B16.5 - Pipe Flanges and Flanged Fittings NPS 1/2 Through NPS 24 Metric/Inch Standard 2017.
- G. ASME B16.9 - Factory-Made Wrought Buttwelding Fittings 2018.
- H. ASME B16.11 - Forged Fittings, Socket-welding and Threaded 2016 (Errata 2017).
- I. ASME B16.25 - Buttwelding Ends 2017.
- J. ASTM A47/A47M - Standard Specification for Ferritic Malleable Iron Castings 1999, with Editorial Revision (2018).
- K. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless 2020.
- L. ASTM A135/A135M - Standard Specification for Electric-Resistance-Welded Steel Pipe 2021.
- M. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service 2019.
- N. ASTM A536 - Standard Specification for Ductile Iron Castings 1984 (Reapproved 2014).
- O. ASTM F438 - Standard Specification for Socket-Type Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 40 2017.
- P. ASTM F439 - Standard Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80 2019.
- Q. ASTM F442/F442M - Standard Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe (SDR-PR) 2019.

- R. ASTM F493 - Standard Specification for Solvent Cements for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe and Fittings 2014.
- S. AWS D1.1/D1.1M - Structural Welding Code - Steel 2015, with Errata (2016).
- T. AWWA C105/A21.5 - Polyethylene Encasement for Ductile-Iron Pipe Systems 2010.
- U. AWWA C110/A21.10 - Ductile-Iron and Gray-Iron Fittings 2012.
- V. AWWA C606 - Grooved and Shouldered Joints 2015.
- W. NFPA 13 - Standard for the Installation of Sprinkler Systems Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- X. NFPA 14 - Standard for the Installation of Standpipe and Hose Systems 2019.
- Y. UL (DIR) - Online Certifications Directory Current Edition.

1.04 PERFORMANCE REQUIREMENTS

- A. Sprinkler system equipment, specialties, accessories, installation, and testing shall comply with the following:
 - 1. NFPA 13 - Standard for the Installation of Sprinkler Systems
 - 2. NFPA 14 - Standard for the Installation of Standpipe and Hose Systems
 - 3. NFPA 20 - Standard for the Installation of Stationary Pumps for Fire Protection
- B. Delegated Design: Engage a qualified Fire Protection professional engineer, as defined in Section 014000 "Quality Requirements," to design project sprinkler systems. Base calculations on results of fire-hydrant flow test. Flow test shall be performed within one year of construction start.
- C. Hydraulic Design Criteria: Sprinkler system design shall be approved by authorities having jurisdiction, Owner's Insurance Underwriter (where applicable) and shall be designed according to the following:
 - 1. Margin of Safety for Available Water Flow and Pressure: 10 percent, including losses through water-service piping, valves, and backflow preventers, or 10 psi, whichever is greater.
 - 2. Sprinkler Occupancy Hazard Classifications: Refer to Drawings.
 - 3. Minimum Density for Automatic-Sprinkler Piping Design: Refer to Drawings.
 - 4. Maximum Protection Area per Sprinkler: According to the latest NFPA 13 standard, UL listing and as specified on Drawings.
 - 5. Total Combined Hose-Stream Demand Requirement: According to latest NFPA 13 standard unless otherwise indicated on drawings.
 - 6. Water velocity in the piping system shall not exceed the following:
 - a. Underground mains: 16 ft/sec.
 - b. Aboveground mains: 32 ft/sec.
 - c. Sprinkler branch lines: 20 ft/sec.
 - 7. Water supply noted on the drawings. If not, Contractor shall make flow test to ascertain water flow.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Delegated-Design Submittal: For all sprinkler systems indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - 1. Shop Drawings and Hydraulic Calculations:
 - a. Indicate pipe materials used, jointing methods, supports, floor and wall penetration seals.

- b. Indicate installation, layout, weights, mounting and support details, and piping connections.
 - c. Layout and name (or number) of each room repeated as shown on the Architect's/Engineer's plans.
 - d. Reflected ceiling plan for each area showing location of partition walls, ceiling grid lines, ceiling light fixtures; proposed location of all fire sprinler heads; and size and location of all piping. Shop drawings shall clearly identify any areas proposed to be protected with "dry type" systems and "anti-freeze type" systems and shall identify sprinkler heads rated for discharge at temperatures other than 165 degrees F.
 - e. Shop drawings shall be submitted to the Architect/Engineer, AHJ and Owner's Insurance Underwriter (where applicable) for review and approval.
- C. Product Data: For each type of product.
1. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
 2. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each fire-department or pump test header connection.
 3. Grooved joint couplings and fittings shall be shown on drawings and product submittals, and be specifically identified with the applicable Victaulic style number.
- D. Shop Drawings, Product Data and Hydraulic calculations shall be reviewed as one package; review of submittals shall not start until Engineer has all product data, hydraulic calculations and shop drawings.

1.06 QUALITY ASSURANCE

- A. Requirements of Regulatory Agencies:
1. Provide fire protection work per the mandatory code requirements, standards of NFPA, and the requirements of the Owner's Insurance Underwriter, where applicable, except where more stringent requirements are indicated, as modified and supplemented by the Contract Documents. The NFPA requirements include the appendices and supplements.
 2. The provisions and recommendations of the NFPA constitute mandatory minimum requirements for work specified herein. No payment will be made by the Owner for extra charges for work added in order to comply with NFPA Standards and Owner's Insurance Underwriter requirements, where applicable.
- B. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
- C. Installer's responsibilities include designing, fabricating, and installing sprinkler systems and providing professional engineering services needed to assume engineering responsibility. Base calculations on results of fire-hydrant flow test.
1. Engineering Responsibility: Preparation of working plans, calculations, and field test reports by a qualified Fire Protection engineer.
- D. All grooved couplings, fittings, valves, and specialties shall be the products of a single manufacturer. Grooving tools shall be of the same manufacturer as the grooved components.
1. All castings used for couplings housings, fittings, or valve and specialty bodies shall be date stamped for quality assurance and traceability.
- E. Comply with UL (DIR) requirements.
- F. Valves: Bear UL (DIR) product listing label or marking. Provide manufacturer's name and pressure rating marked on valve body.
- G. Products Requiring Electrical Connection: Listed and classified as suitable for the purpose specified and indicated.
- H. Pipe: Each length of pipe shall be legibly identified at mill by paint, stenciling or raised symbols identifying manufacturer and class type or schedule of pipe. Copper pipe shall be identified at 3

foot intervals.

- I. Fittings: To be identified by manufacturer by permanently attached tags, imprints or other approved means indicating class of wall thickened and material.

1.07 DEVIATIONS FROM BASIS OF DESIGN MANUFACTURER

- A. Should the Division 23 Contractors submit equipment by a Manufacturer other than that indicated as the Basis of Design on the Drawings, Contractor shall then be responsible for evaluating the impacts of the proposed Manufacturer's equipment, even if the Manufacturer is listed in the specifications as an approved equal. This includes the proposed Manufacturer's electrical, architectural and structural requirements and their subsequent impacts on the current design (roof openings, curbs, structural support, etc.) and coordination of any differing dimensions and clearances with all other trades.

1.08 FIELD CONDITIONS - RENOVATION PROJECTS

- A. Interruption of Existing Sprinkler Service: Do not interrupt sprinkler service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary sprinkler service according to requirements indicated:
 1. Notify Architect & Construction Manager no fewer than five days in advance of proposed interruption of sprinkler service.
 2. Do not proceed with interruption of sprinkler service without Architect's and Construction Manager's written permission.

1.09 DELIVERY, STORAGE AND HANDLING

- A. Deliver and store valves in shipping containers, with labeling in place.
- B. Provide temporary protective coating on cast iron and steel valves.
- C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

PART 2 PRODUCTS

2.01 FIRE PROTECTION SYSTEMS

- A. Sprinkler Systems: Comply with NFPA 13.
- B. Standpipe and Hose Systems: Comply with NFPA 14.
- C. Welding Materials and Procedures: Comply with ASME BPVC-IX.

2.02 BURIED PIPING

- A. Steel Pipe: ASTM A53/A53M Schedule 40 or ASTM A135/A135M Schedule 10, black, with AWWA C105/A21.5 polyethylene jacket, or double layer, half-lapped polyethylene tape.
 1. Steel Fittings: ASME B16.9, wrought steel, buttwelded, ASME B16.25, buttweld ends, ASTM A234/A234M, wrought carbon steel or alloy steel, ASME B16.5, steel flanges and fittings, or ASME B16.11, forged steel socket welded and threaded; with double layer, half-lapped polyethylene tape.
 2. Cast Iron Fittings: ASME B16.1, flanges and flanged fittings.
 3. Joints: Welded in accordance with AWS D1.1/D1.1M.
 4. Casing: Closed glass cell insulation.
- B. Ductile Iron Pipe: AWWA C151/A21.51.
 1. Fittings: AWWA C110/A21.10, standard thickness.
 2. Joints: AWWA C111/A21.11, styrene butadiene rubber (SBR) or vulcanized SBR gasket.
 3. Mechanical Couplings: Shaped composition sealing gasket, steel bolts, nuts, and washers.

2.03 ABOVE GROUND PIPING

- A. Steel Pipe: ASTM A53 Schedule 40 or ASTM A135/A135M Schedule 10, black.

1. Cast Iron Fittings: ASME B16.1, flanges and flanged fittings and ASME B16.4, threaded fittings.
 2. Malleable Iron Fittings: ASME B16.3, threaded fittings and ASTM A47/A47M.
 3. Ductile iron Fittings: ASTM A536, Grade 65-45-12. In applicable sizes, fittings shall be short pattern, with flow equal to standard pattern fittings.
 - a. Basis of Design: Victaulic FireLock.
 4. Mechanical Grooved Couplings: Two ductile iron housing clamps to engage and lock, "C" shaped elastomeric sealing gasket, ASTM A449 compliant steel bolts, nuts; galvanized for galvanized pipe.
 - a. Rigid Type: Housings cast with offsetting, angle-pattern, bolt pads to provide system rigidity and support and hanging in accordance with NFPA-13, fully installed at visual pad-to-pad offset contact. Couplings that require exact gapping at specific torque ratings are not permitted.
 - 1) Installation-Ready for complete installation without field disassembly.
 - 2) Basis of Design: Victaulic Style 009N and 107N.
 - b. Flexible Type: For use in locations where vibration attenuation and stress relief are required.
 - 1) Basis of Design: Victaulic Installation-Ready Style 177 or Style 77.
 - c. Installation-Ready gaskets are center-leg, with pipe stop to ensure proper groove engagement, alignment, and pipe insertion depth.
 5. Installation-Ready fittings for Schedule 40 & 10 grooved end steel piping in fire protection applications sizes NPS 1-¼ thru 2½ (DN 32 thru DN 65). Fittings shall consist of a ductile iron housing conforming to ASTM A-536, Grade 65-45-12, with Installation-Ready ends, orange enamel coated, red enamel coated or galvanized. Fittings complete with prelubricated Grade "E" EPDM Type 'A' gasket; and ASTM A449 electroplated steel bolts and nuts. System shall be UL listed for a working pressure of 300 psi (2065 kPa) and FM approved for working pressure 365 psi (2517kPa).
 6. Mechanical Formed Fittings: Carbon steel housing with integral pipe stop and O-ring pocked and O-ring, uniformly compressed into permanent mechanical engagement onto pipe.
- B. CPVC Pipe (for Residential NFPA 13R applications only): ASTM F442/F442M, SDR 13.5.
1. Fittings: ASTM F438 Schedule 40, or ASTM F439 schedule 80, CPVC.
 2. Joints: Solvent welded, using ASTM F493 cement.

2.04 PIPE SLEEVES

- A. Vertical Piping:
1. Sleeve Length: 1 inch above finished floor.
 2. Provide sealant for watertight joint.
- B. Plastic, Sheet Metal, or Moisture-Resistant Fiber: Pipe passing through interior walls, partitions, and floors, unless steel or brass sleeves are specified below.
- C. Pipe Passing Through Below Grade Exterior Walls:
1. Zinc coated or cast iron pipe.
 2. Provide watertight space with link rubber or modular seal between sleeve and pipe on both pipe ends.
- D. Pipe Passing Through Quarry Tile, Terrazzo, or Ceramic Tile Floors:
1. Brass pipe.
 2. Connect sleeve with floor plate.
- E. Pipe Passing Through Concrete Beam Flanges, except where Brass Pipe Sleeves are Specified:
1. Galvanized steel pipe or black iron pipe with asphalt coating.

2. Connect sleeve with floor plate except in mechanical rooms.
- F. Pipe Passing Through Mechanical, Laundry, and Animal Room Floors above Basement:
 1. Galvanized steel pipe or black iron pipe with asphalt coating.
 2. Connect sleeve with floor plate except in mechanical rooms.
- G. Clearances:
 1. Provide allowance for insulated piping.
 2. Wall, Floor, Floor, Partitions, and Beam Flanges: 1 inch greater than external; pipe diameter.
 3. Rated Openings: Caulked tight with fire stopping material complying with ASTM E814 in accordance with Section 07 8400 to prevent the spread of fire, smoke, and gases.

2.05 MANUFACTURED SLEEVE-SEAL SYSTEMS

- A. Modular/Mechanical Seal:
 1. Synthetic rubber interlocking links continuously fill annular space between pipe and wall/casing opening.
 2. Provide watertight seal between pipe and wall/casing opening.
 3. Elastomer element size and material in accordance with manufacturer's recommendations.

2.06 ESCUTCHEONS

- A. Material:
 1. Metals and Finish: Comply with ASME A112.18.1.
- B. Construction:
 1. One-piece for mounting on chrome-plated tubing or pipe and one-piece or split-pattern type elsewhere.
 2. Internal spring tension devices or setscrews to maintain a fixed position against a surface.

2.07 PIPE HANGERS AND SUPPORTS

- A. Supporting Elements: provide UL/FM components per NFPA 13, ANSI B 31.1 and MSS SP-58 except that "C" clamps or any modification thereof are unacceptable.
 1. "C" clamps: With set screw, locknut and restraining strap are acceptable for piping up to 2-1/2".
- B. Furnish necessary piping and equipment supporting elements including; building structure attachments; supplementary steel; hanger rods, stanchions and fixtures; vertical pipe attachments; horizontal pipe attachments; anchors; guides.
- C. Center Loading Beam Clamps: For attachments to building structure as approved except piping supported from top of steel.

2.08 MECHANICAL COUPLINGS

- A. Manufacturers:
 1. Tyco Fire Protection Products: www.tyco-fire.com/#sle.
 2. Victaulic Company: www.victaulic.com/#sle.
 3. Anvil/Gruvlok: www.anvilintl.com
 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Rigid Mechanical Couplings for Grooved Joints:
 1. Dimensions and Testing: Comply with AWWA C606.
 2. Minimum Working Pressure: 300 psig.
 3. Housing Material: Fabricate of ductile iron complying with ASTM A536.
 4. Gasket Material: EPDM-HP suitable for operating temperature range from minus 30 degrees F to 250 degrees F.
 5. Bolts and Nuts: Hot dipped galvanized or zinc electroplated steel.

- C. Only use grooved coupling as permitted by NFPA 13 and NFPA 14.

2.09 INCOMING FIRE SERVICE BACKFLOW PREVENTER

- A. A backflow preventer assembly shall be installed on fire protection systems when connected to a drinking water supply. Degree of hazard present and type of incoming service backflow preventer shall be coordinated with the Authority Having Jurisdiction.
- B. Double Check Detector Assembly
1. ASSE 1048, UL 1469, AWWA C510-92: The main valve body shall be manufactured from 300 Series stainless-steel to provide corrosion resistance, 100% lead free* through the waterway. The double check detector assembly consists of two independently operating, spring loaded check valves, two UL, FM, OSY resilient seated gate valves, and bypass assembly. The bypass assembly consists of a meter, a double check including shutoff valves and required test cocks. Each cam-check shall be internally loaded and provide a positive drip tight closure against reverse flow. Cam-check includes a stainless-steel cam arm and spring, rubber faced disc and a replaceable seat. There shall be no brass or bronze parts used within the cam-check valve assembly. The check valve seats shall be of molded thermoplastic construction. The use of seat screws as a retention method is prohibited. All internal parts shall be accessible through a single cover on the valve assembly. The valve cover shall be held in place through the use of a single grooved style two-bolt coupling. The bypass line shall be hydraulically sized to accurately measure low flow. The bypass line shall consist of a meter, a small diameter double check assembly with test cocks and isolation valves. The bypass line double check valve shall have two independently operating modular poppet check valves, and top mounted test cocks.
 2. May be installed horizontal or vertical "flow up" position.
 3. Basis of Design: Ames Series 3000SS

PART 3 EXECUTION

3.01 FIRE SUPPRESSION PIPING APPLICATIONS

- A. CPVC pipe, Schedule 40 or Schedule 80 CPVC fittings, and solvent-cemented joints may be used for residential occupancies ONLY.
- B. Standard-pressure, wet-pipe sprinkler system, NPS 2 (DN 50) and smaller, shall be one of the following:
1. Schedule 40, black-steel pipe with threaded ends; uncoated, gray-iron threaded fittings; and threaded joints.
 2. Schedule 40, black-steel pipe with roll-grooved ends; uncoated, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
 3. Schedule 40, black-steel pipe with plain ends; steel welding fittings; and welded joints.
- C. Standard-pressure, wet-pipe sprinkler system, NPS 2-1/2 (DN 65) and larger, shall be one of the following:
1. Schedule 40, black-steel pipe with roll-grooved ends; uncoated, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
 2. Schedule 40, black-steel pipe with plain ends; steel welding fittings; and welded joints.
 3. Schedule 10, black-steel pipe with roll-grooved ends; uncoated, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
 4. Schedule 10, black-steel pipe with plain ends; uncoated, plain-end-pipe fittings; and twist-locked joints.
 5. Schedule 10, black-steel pipe with plain ends; welding fittings; and welded joints.
- D. High-pressure, wet-pipe sprinkler system, shall be one of the following:
1. Schedule 40, black-steel pipe with plain ends; steel welding fittings; and welded joints.

3.02 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel or groove plain end ferrous pipe.
- B. Remove scale and foreign material, from inside and outside, before assembly.
- C. Prepare piping connections to equipment with flanges or unions. Unions or flanges for servicing and disconnect are not required in installations using grooved joint couplings.

3.03 INSTALLATION

- A. Install sprinkler system and service main piping, hangers, and supports in accordance with NFPA 13.
- B. Install standpipe piping, hangers, and supports in accordance with NFPA 14.
- C. Route piping in orderly manner, plumb and parallel to building structure. Maintain gradient.
- D. Install piping to conserve building space, to not interfere with use of space and other work.
- E. Group piping whenever practical at common elevations.
- F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- G. Pipe Hangers and Supports:
 - 1. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
 - 2. Place hangers within 12 inches of each horizontal elbow.
 - 3. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
 - 4. Support vertical piping at every other floor. Support riser piping independently of connected horizontal piping.
 - 5. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
 - 6. Provide copper plated hangers and supports for copper piping.
- H. Slope piping and arrange systems to drain at low points. Use eccentric reducers to maintain top of pipe level.
- I. Prepare pipe, fittings, supports, and accessories for finish painting. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.
- J. Structural Considerations:
 - 1. Do not penetrate building structural members unless indicated.
- K. Provide sleeves when penetrating footings, floors, and walls. Seal pipe including sleeve penetrations to achieve fire resistance equivalent to fire separation required.
- L. Manufactured Sleeve-Seal Systems:
 - 1. Install manufactured sleeve-seal systems in sleeves located in grade slabs and exterior concrete walls at piping entrances into building.
 - 2. Provide sealing elements of the size, quantity, and type required for the piping and sleeve inner diameter or penetration diameter.
 - 3. Locate piping in center of sleeve or penetration.
 - 4. Install field assembled sleeve-seal system components in annular space between sleeve and piping.
 - 5. Tighten bolting for a water-tight seal.
 - 6. Install in accordance with manufacturer's recommendations.
- M. Escutcheons:
 - 1. Install and firmly attach escutcheons at piping penetrations into finished spaces.

2. Provide escutcheons on both sides of partitions separating finished areas through which piping passes.
 3. Use chrome plated escutcheons in occupied spaces and to conceal openings in construction.
- N. When installing more than one piping system material, ensure system components are compatible and joined to ensure the integrity of the system. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.
- O. Grooved joints shall be installed in accordance with the manufacturer's latest published instructions. The gasket style and elastomeric material (grade) shall be verified as suitable for the intended service. Gaskets shall be molded and produced by the grooved coupling manufacturer. Grooved ends shall be clean and free from indentations, projections, and roll marks in the area from pipe end to groove. Grooved coupling manufacturer's factory trained field representative shall provide on-site training for contractor's field personnel in the proper use of grooving tools, application of groove, and installation of grooved piping products. Factory trained representative shall periodically visit the jobsite to ensure best practices in grooved product installation are being followed. Contractor shall remove and replace any improperly installed products.
- P. Where pipes are in partitions, furred out spaces and chases, obtain information as to their exact location and size and install work so as to be entirely concealed in allotted space. If conflicts arise making this impossible, obtain instructions from Architect before proceeding with work.
- Q. Where there is evidence that parts of fire protection work will interfere with other work, assist in working out space conditions and/or structure, make necessary adjustments to accommodate work.
- R. Fire protection work installed before coordinating with other work so as to cause interference with other work to be changed to correct such condition without additional cost to Owner.
- S. Accessibility:
1. Install fire protection work to permit removal (without damage to other parts) of coils, heat exchangers, pumps, fan shafts and wheels, belt guards, sheaves and drives and other parts requiring periodic replacement or maintenance.
 2. Arrange pipes and equipment to permit ready access to valves, cocks, traps, starters, motors, dampers, control components and to clear openings of swinging and overhead doors and of access panels.
- T. When necessary to install "U"-shaped dip in a pipe due to a conflict with duct work or other building components, Contractor shall install a $\frac{3}{4}$ " diameter hose nipple and cap pointing down at lowest point in pipe dip. Contractor shall try to arrange piping layout to avoid such dips; no such dip shall be installed without prior approval of Engineer. All such conditions shall be clearly located and noted on record drawings given to Owner.
- U. When necessary to install inverted "U" in branch piping to rise above an obstruction, Contractor shall install an upright $\frac{3}{4}$ " diameter air vent nipple and cap at high point of inverted "U". Contractor shall try to arrange piping layout to avoid such high points; no such installation shall be made without approval of Engineer. All such conditions shall be clearly located and noted on record drawings given to Owner.
- V. Contractor shall provide Owner with at least 24 hours prior notice before commencing sprinkler installations. Owner shall be responsible for deactivating building alarm system and notifying local fire department or other agencies. Under no circumstances shall Contractor attempt to deactivate building alarm system or circumvent any valve tamper switch. Contractor shall perform all work during normal business hours. By the end of each working day, Contractor shall cap all pipe ends.
- W. Pressure test completed work in progress, repair any leaks and otherwise make the sprinkler system water tight so that fire alarm and sprinkler protection system can be reactivated by

Owner during non-business hours.

3.04 SOUND CONTROL

- A. Penetrations shall be maintained airtight to prevent sound transfer.
- B. Piping shall pass through sleeves. Pack sleeves tight with glass fiber or oakum and caulked on both sides with non-hardening acoustical sealant.

3.05 CLEANING

- A. Flush entire piping system of foreign matter in accordance with NFPA 13.
- B. Upon completion of work, clean all parts of the installation.
- C. Clean equipment, pipes, valves, and fittings of grease, metal cuttings, and sludge that may have accumulated from the installation and testing of the system.

3.06 TESTING AND ACCEPTANCE

- A. After completing branch system, Contractor shall test fire sprinkler piping hydrostatically for a period of two hours at not less than 200 psi or at 50 psi in excess of the maximum operating static pressure when the maximum static pressure exceeds 150 psi. Contractor shall check system for leakage of joints and measure hydrostatic pressure at low point of each system or zone being tested.
- B. The Contractor shall repair or replace piping and fittings as required to eliminate leakage (in accordance with NFPA standards for "little or no leakage") and retest as specified to demonstrate compliance.
- C. Upon satisfactory completion and testing of branch piping system, Contractor shall provide Owner with a letter certifying that branch piping system has been completed in accordance with NFPA 13 and is operational, complete and has no defects.
- D. Test shall be witnessed by Architect/Owner and any authorities having jurisdiction who may so require.

SECTION 210553
IDENTIFICATION FOR FIRE SUPPRESSION PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Nameplates.

1.02 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturers catalog literature for each product required.

PART 2 PRODUCTS

2.01 IDENTIFICATION APPLICATIONS

- A. Control Panels: Nameplates.
- B. Pumps: Nameplates.
- C. Valves: Nameplates.

2.02 NAMEPLATES

- A. Manufacturers:
 - 1. Brimar Industries, Inc: www.pipemarker.com/#sle.
 - 2. Kolbi Pipe Marker Company: www.kolbipipemarkers.com/#sle.
 - 3. Seton Identification Products, a Tricor Direct Company: www.seton.com/#sle.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Description: Laminated three-layer plastic with engraved letters.

PART 3 EXECUTION

3.01 PREPARATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.

3.02 INSTALLATION

- A. Install nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.

**SECTION 211300
SUPPRESSION SPRINKLER SYSTEMS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Wet-pipe sprinkler system.
- B. Dry-pipe sprinkler system.
- C. System design, installation, and certification.

1.02 RELATED REQUIREMENTS

- A. Section 21 0500 - Common Work Results for Fire Suppression: Pipe and fittings.
- B. Section 21 0523 - General-Duty Valves for Water-Based Fire-Suppression Piping.
- C. Section 21 0553 - Identification for Fire Suppression Piping and Equipment.
- D. Section 21 1200 - Fire-Suppression Standpipes: Fire Department Connections.

1.03 REFERENCE STANDARDS

- A. ITS (DIR) - Directory of Listed Products current edition.
- B. NFPA 13 - Standard for the Installation of Sprinkler Systems Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- C. UL (DIR) - Online Certifications Directory Current Edition.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on sprinklers, valves, and specialties, including manufacturers catalog information. Submit performance ratings, rough-in details, weights, support requirements, and piping connections.
- C. Sprinklers shall be referred to on drawings, submittals and other documentation, by the sprinkler identification or Model number as specifically published in the appropriate agency listing or approval. Trade names or other abbreviated designations shall not be allowed.
- D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.
 - 2. Extra Sprinklers: Type and size matching those installed, in quantity required by referenced NFPA design and installation standard.
 - 3. Sprinkler Wrenches: For each sprinkler type.
- E. Project Record Documents: Record actual locations of sprinklers and deviations of piping from drawings. Indicate drain and test locations.

1.05 QUALITY ASSURANCE

- A. Comply with UL (DIR) requirements.
- B. Designer Qualifications: Design system under direct supervision of a Professional Engineer experienced in design of this type of work and licensed in the State in which the Project is located.
- C. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
- D. All grooved couplings, fittings, valves, and specialties shall be the products of a single manufacturer. Grooving tools shall be of the same manufacturer as the grooved components.
 - 1. All castings used for couplings housings, fittings, or valve and specialty bodies shall be date stamped for quality assurance and traceability.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Sprinklers, Valves, and Equipment:
 - 1. Victaulic Company: www.victaulic.com
 - 2. Viking Corporation: www.vikinggroupinc.com/#sle.
 - 3. Substitutions: See Section 01 6000 - Product Requirements.

2.02 SPRINKLER SYSTEM

- A. Sprinkler System: Provide coverage for building areas noted.
- B. Occupancy: Refer to Schedule on Drawings.
- C. Water Supply: Determine volume and pressure from water flow test data.
- D. Interface system with building fire and smoke alarm system.
- E. Storage Cabinet for Spare Sprinklers and Tools: Steel, located adjacent to alarm valve.

2.03 SPRINKLERS

- A. Sprinklers shall be glass bulb type, with hex shaped wrench boss integrally cast into the sprinkler body to reduce the risk of damage during installation.
 - 1. Wrenches shall be provided by the sprinkler manufacturer that directly engage the hex-shaped wrench boss integrally cast in the sprinkler body.
- B. Suspended Ceiling Type: Concealed pendant type with matching push on escutcheon plate.
 - 1. Response Type: Quick.
 - 2. Coverage Type: Standard.
 - 3. Fusible Link: Glass bulb type temperature rated for specific area hazard.
 - a. Basis of Design: Victaulic Model V38.
- C. Exposed Area Type: Pendant type with guard.
 - 1. Response Type: Quick.
 - 2. Coverage Type: Standard.
 - 3. Fusible Link: Glass bulb type temperature rated for specific area hazard.
 - a. Basis of Design: Victaulic Model V27.
- D. Sidewall Type: Semi-recessed horizontal sidewall type with matching push on escutcheon plate.
 - 1. Response Type: Quick.
 - 2. Coverage Type: Standard.
 - 3. Fusible Link: Glass bulb type temperature rated for specific area hazard.
- E. Flexible Drop System: Stainless steel, multiple use, open gate type.
 - 1. Application: Use to properly locate sprinkler heads.
 - 2. Include all supports and bracing.
 - 3. Provide braided type tube as required for the application.
 - 4. The drop system shall consist of a braided type 304 stainless steel flexible tube, zinc plated steel Male threaded nipple or Victaulic FireLock IGS Groove Style 108 coupling for connection to branch-line piping, and a zinc plated steel reducer with a female thread for connection to the sprinkler head.
 - 5. The drop shall include a UL approved Series AH1 with 3" bend radius; AH2 or AH2-CC braided hose with a bend radius to 2" to allow for proper installation in confined spaces.
 - 6. The flexible drop shall attach to the ceiling grid using a one-piece open gate Series AB1 or AB2 bracket. The bracket shall allow installation before the ceiling tile is in place.
 - 7. Manufacturers:

- a. Victaulic Company; Victaulic VicFlex™ Multiple-Use Flexible Stainless Steel Sprinkler Drop System [with captured coupling Style 108].
- b. Substitutions: See Section 01 6000 - Product Requirements.
8. In lieu of rigid connections to dry sprinkler heads, a Victaulic VicFlex™ dry sprinkler, Model VS1, may be used. The sprinkler shall provide a vertical or horizontal flexible connection with a bend radius to 2", and allow for up to 4 bends
9. In lieu of rigid pipe offsets or return bends for sprinkler drops in wet, dry, and preaction systems in cold storage applications, the Victaulic VicFlex™ V33, V36, or V40 Dry Sprinkler with Integral AB6 Assembly may be used.
10. In lieu of threaded steel piping systems, the Victaulic FireLock IGS System with "Installation-Ready™ fittings and couplings may be used for NPS 1 (DN 25) Schedule 10 and Schedule 40 carbon steel pipe in fire protection applications. System rated for a working pressure to 365 psi (2517 kPa).
 - a. Groove: IGS "Innovative Groove System" groove with shortened "A" dimension and tapered groove backside for ease of installation.
 - b. Grooving Tool: Victaulic RG2100, with IGS Confirmation Gauge.
 - c. Victaulic V9 sprinkler heads may be used in direct substitution where applicable.

2.04 PIPING SPECIALTIES

- A. Wet Pipe Sprinkler Alarm Valve: Check type valve with divided seat ring, rubber faced clapper to automatically actuate water motor alarm, pressure retard chamber and variable pressure trim with the following additional capabilities and features:
 1. Activate electric alarm.
 2. Test and drain valve.
 3. Replaceable internal components without removing valve from installed position.
 4. Manufacturers:
 - a. Victaulic Company; Series 751 with Series 760 motor alarm: www.victaulic.com/#sle.
 - b. Substitutions: See Section 01 6000 - Product Requirements.
- B. Dry Pipe Sprinkler Alarm Valve: Check type valve with divided seat ring, rubber faced clapper to automatically actuate water motor alarm, accelerator, and with the following additional capabilities and features:
 1. Activate electric alarm.
 2. Test and drain valve.
 3. Externally resettable.
 4. Replaceable internal components without removing valve from installed position.
 5. Required air pressure shall be 13-psi (90-kPa).
 6. Manufacturers:
 - a. Victaulic Company; Series 768N- NXT: www.victaulic.com/#sle.
 - b. Substitutions: See Section 01 6000 - Product Requirements.
- C. Riser Manifold Assemblies
 1. Riser Manifold: integral vane type flow switch and test drain assembly with pressure gauge, grooved connections, 250 psi maximum working pressure; all components to be UL listed.
 2. Universal Manifold Check Assembly: Ductile iron construction, incorporating a control valve, check valve, flow switch, adjustable relief valve, and system gauges in one compact body/footprint. The assembly should include the following additional capabilities and features:
 - a. Activate electric alarm.
 - b. Test and drain assembly with a universal test orifice and adjustable relief valve with a range of 175 to 310 psi.
 - c. Replaceable internal components without removing valve from installed position.

- d. Rated for use at the maximum service pressure of 300 psi.
- e. UL Listed and FM Approved.
- f. Manufacturers:
 - 1) Victaulic Company; Model Globe UMC: <https://globesprinkler.com/product-detail/umc-floor-control-shotgun-riser-assembly>.
 - 2) Substitutions: See Section 01 6000 - Product Requirements.
- D. Test Connections:
 - 1. Inspector's Test Connection:
 - a. Acceptable Manufacturers
 - 1) AFG Manufacturing
 - 2) Elkhart Brass
 - 3) Guardian Fire Equipment Inc.
 - 4) Potter-Roemer
 - b. UL/FM Cast brass body with spring loaded position indicator with positive shut-off. In-line flow with self-draining, clearable sight glass. Tamper-proof orifice permanently installed. Model 1000 Test and Drain manufactured by AFG Manufacturing Inc.
 - E. Electric Alarm: Electrically operated chrome plated gong with pressure alarm switch.
 - F. Water Flow Switch: Vane type switch for mounting horizontal or vertical, with two contacts; rated 10 amp at 125 volt AC and 2.5 amp at 24 volt DC.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with referenced NFPA design and installation standard.
- B. Install equipment in accordance with manufacturer's instructions.
- C. Locate outside alarm gong on building wall as indicated.
- D. Place pipe runs to minimize obstruction to other work.
- E. Place piping in concealed spaces above finished ceilings.
- F. Center sprinklers in two directions in ceiling tile and provide piping offsets as required.
- G. Do not install sprinklers that have been dropped, damaged, show a visible loss of fluid, or a cracked bulb.
- H. The sprinkler bulb protector shall be removable by hand, without tools or devices that may damage the bulb.
- I. Apply masking tape or paper cover to ensure concealed sprinklers, cover plates, and sprinkler escutcheons do not receive field paint finish. Remove after painting. Replace painted sprinklers.
- J. Flush entire piping system of foreign matter.
- K. Hydrostatically test entire system.
- L. Require test be witnessed by Fire Marshal.

3.02 INTERFACE WITH OTHER PRODUCTS

- A. Ensure required devices are installed and connected as required to fire alarm system.

**SECTION 220005
BASIC PLUMBING REQUIREMENTS**

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. This section applies to all sections of Division 22.
- B. Drawings and general provisions of the contract, including Division 00 and Division 01 specification sections, apply to work of this section.
- C. Provide all items, articles, materials, operations or methods listed, mentioned or scheduled on drawings and/or herein, including all labor, materials, equipment and incidentals necessary and required for their completion.
- D. The items in this section are supplementary to the requirements set forth in other portions of the specifications as indicated under item "A" above.

1.02 APPLICATION

- A. This section applies to all plumbing work. The contractors involved shall check all sections of the specifications in addition to the particular section covering their specific trade. Each distinct section of the specifications aimed for one trade may have detailed information with regards to other trades, therefore, it is imperative that all sections be reviewed to get a complete picture of all other trades' functions and work required.
- B. The plumbing contractor is responsible for the installation and operation of the plumbing systems.
- C. The plumbing contractor is responsible for receiving, unloading and placement of all of the owner provided equipment.

1.03 INSPECTION OF SITE

- A. Each Contractor shall visit the site prior to bid submission to determine all existing conditions that may affect his work and shall make appropriate allowances for such conditions in his bid. Failure to visit the site shall not be cause for a request for additional compensation later in the project during construction.
- B. The submitting of a proposal implies that the contractor has visited the site and understands the conditions under which the work must be conducted.
- C. Install Work in locations shown on Drawings, unless prevented by Project conditions.
- D. Prepare drawings showing proposed rearrangement of Work to meet Project conditions, including changes to Work specified in other Sections. Obtain permission of Owner before proceeding.

1.04 ALTERNATES AND SUBSTITUTIONS

- A. Refer to Division 01 - General Requirements for procedures to submit products by a Manufacturer that is not listed as approved equal in the Specifications.

1.05 DEVIATIONS FROM BASIS OF DESIGN MANUFACTURER

- A. Products identified within the schedules and details are used as the basis of design for laying out and coordinating with other trades such as structural, architectural, and electrical. Should Division 22 Contractor submit products by a manufacturer other than that indicated as Basis of Design in the Drawings, Contractor shall then be responsible for evaluating the impacts of the proposed Manufacturer's equipment, even if the Manufacturer is listed in the specifications as an approved equal. This includes the proposed Manufacturer's electrical, architectural and structural requirements and their subsequent impacts on the current design and coordination of any differing dimensions and clearances with all other trades. This evaluation shall be included as part of the proposed product submittal.

1.06 MATERIALS

- A. Plumbing equipment is to be furnished with motors, electrical controls and protective devices, and integral operating devices which are normally included by the manufacturer or required by the Contract Documents.
- B. The Plumbing trades shall provide all control wiring, 120 volts and less, for the equipment and devices furnished under Division 22 of these specifications, including all wiring devices, transformers, conduit, etc. Any conduits used for control wiring shall meet the specifications as indicated in Division 26.
- C. Power wiring 120 volts and greater shall be by the Electrical Trades.

1.07 CODES, PERMITS AND FEES

- A. Unless otherwise indicated, all required permits, licenses, inspections, approvals and fees for plumbing work shall be secured and paid for by the contractor. All work shall conform to all applicable codes, rules and regulations. Applicable publications listed in all sections of Division 22 shall be the latest issue, unless otherwise noted.
- B. Rules of local utility companies and municipalities shall be complied with. Check with the utility company and/or municipality supplying service to the installation and determine all devices including, but not limited to: meters, regulators, valves which will be required and include the cost of all such items in the proposal.
- C. All work shall be executed in accordance with the rules and regulations set forth in local and state codes. Prepare any detailed drawings or diagrams which may be required by the governing authorities. Where the drawings and/or specifications indicate materials or construction in excess of code requirements, the drawings and/or specifications shall govern.

1.08 MAINTENANCE

- A. Provide 8 hours of instruction to the owner's designated personnel in the maintenance and operation of equipment and systems.
- B. Provide complete maintenance and operating instructional manuals covering all mechanical equipment herein specified, together with parts lists. Maintenance and operating instructional manuals shall be job specific to this project. Generic manuals are not acceptable. Manuals shall be submitted in electronic format for review. When approved, four (4) bound hard copies and an indexed electronic PDF shall be provided to the owner. Maintenance and operating instructional manuals shall be provided when construction is approximately 75% complete.

1.09 WARRANTY AND GUARANTEE

- A. Contractor shall guarantee all work installed by him or his subcontractors to be free from defect in material and workmanship for a period of one year from date of final acceptance of the work, unless a longer period is stipulated under specific headings. Contractor shall repair or replace at no additional cost to the owner, any material or equipment developing defects and shall also make good any damage caused by such defects or the correction of defects. Repairs or replacements shall bear additional guarantee, as originally called for, dated from the final acceptance of the repair or replacement. This requirement shall be binding even though it will exceed product guarantees normally furnished by some manufacturers. Contractor shall submit his own and each equipment manufacturers written certificates, warranting that each item of equipment furnished complies with all requirements of the drawings and specifications. Note that guarantee shall run from date of final acceptance of the work, not from date of installation of a device or piece of equipment.

1.10 SUBMITTALS

- A. Shop drawings and samples shall be submitted in compliance with the Conditions of the Contract and Division 1 General Requirements.

- B. Contractor shall provide submittals where items are referred to by symbolic designation on the drawings. All submittals shall bear the same designation (plumbing piping, plumbing fixtures, etc.). Refer to other sections of the electrical specifications for additional requirements.
- C. Shop Drawings: Each piece of equipment shall be identified by the number shown in the schedules and by specification article number pertaining to the item. Shop drawings shall as a minimum be ¼" equals 1' 0" scale, and shall be newly prepared by the Contractor and not reproduced from the Architect's drawings. Layouts shall be made for all floor plans including all ductwork, piping, electrical distribution and other mechanical equipment. Layouts shall show clearances of piping, ducts, etc., above floor.
- D. Contractor shall obtain Engineer's approval on all the work before any equipment is purchased, or any work installed. Contractor shall also secure approval of the Governmental Authorities having jurisdiction on all equipment and on the layout of the complete system.
- E. The Engineer's review and approval of shop drawings is a gratuitous assistance and in no way does it relieve the Contractor from responsibility for errors or omissions which may exist on the shop drawings. Where such errors or omissions are discovered later, they must be made good by the Contractor, without any additional cost to the Owner, irrespective of any approval by the Engineer.
 - 1. The Contractor shall incorporate with his shop drawings, a letter indicating all deviations from the plans and/or specifications. If in the opinion of the Architect, the deviations are not equal, the Contractor will be required to furnish the item as specified and as indicated on the drawings.
 - 2. Record documents shall be submitted in compliance with the requirements of the Specifications.
- F. Engineer WILL NOT REVIEW:
 - 1. Submittals not specified.
 - 2. Submittals not reviewed by Contractor; including Contractor stamp with signature comments.
 - 3. Submittals made after work is delivered to site and/or installed.
 - 4. Submittal resubmissions unless resubmission is required by Architect/Engineer.
- G. Installation of any item that requires submittal approval by the engineer shall be installed at the contractors risk. The contractor, at his cost, shall remove all work installed prior to approval of the submittal.
- H. The engineer will not be responsible for errors in quantities, or dimensions required to fit the job condition, details of fabrication to insure proper assembly at the job, or for errors resulting from errors in submittals.
- I. For underground piping, record dimensions and invert elevations of all piping, including all offsets, fittings, cathodic protection and accessories. Locate dimensions from benchmarks that will be preserved after construction is complete.

1.11 RECORD DRAWINGS

- A. Refer to Division 01 - General Requirements for procedures. All literature shall be furnished in accordance with requirements listed in Division 01.
- B. Contractor shall provide the following record drawings as part of the Project closeout document process:
 - 1. Contract Documents, specifications and submittals, indicating "As-Built" conditions and actual products selected for use.
 - 2. Product and Maintenance manuals for all equipment listed within this specification manual and in Contract Documents. Provide with parts lists as applicable.

1.12 QUALITY ASSURANCE

- A. Other referenced standards:
1. Comply with referenced standards, guidelines, data sheets from various associations, including NFPA, ANSI, ASTM, ASME, ASHRAE.

PART 2 PRODUCTS

2.01 SLEEVES AND ESCUTCHEONS

- A. Provide sleeves wherever pipes pass through exterior wall and floors. Sleeves shall be schedule 40 steel pipe cut to length. Sleeves shall terminate flush with walls, partitions and ceilings in finished areas. All sleeves through floor shall extend 2" above floor. Provide cast brass nickel-plated escutcheons with positive catches on each visible sleeve penetration. Sleeves are to be sealed at each installation with a 3M approved sealant. The space between the inside of the sleeve and the outside of the pipe or conduit within the sleeve shall be sealed at each installation with a 3M approved sealant.

2.02 DIELECTRIC UNIONS

- A. Dielectric unions shall be used to connect dissimilar metals (such as steel and copper) to prevent electrolytic action.
- B. Dielectric waterway fittings shall be a copper-silicon casting conforming to UNS C87850, and UL classified in accordance with ANSI / NSF-61 for potable water service.

2.03 BUILDING ATTACHMENTS FOR PLUMBING WORK SUPPORTS

- A. General Requirements:
1. Provide building attachments required for supporting plumbing work, suitably selected and installed for the loads applied with a minimum additional safety factor of 3.
 2. Where specified attachments are not suitable for conditions, submit to Engineer for approval, proposal for alternate building attachments.
 3. If specially designed building attachments are required, retain the services of a licensed structural engineer to design such building attachments.
 4. Approved Manufacturers: Grinnell, or equivalent products by Michigan Hanger and B-Line.
 5. Provide supplemental trapeze supports where necessary. Design trapeze to support all trades. Coordinate loads, and supports with all trades. Size trapeze for maximum deflection of 1/64 of the span.
- B. Attachments to Structural Steel:
1. Support plumbing work from building structural steel where possible and approved. No welding or bolting to structural steel is permitted unless authorized by Architect. C-clamps are not permitted.
 - a. Center beam clamp - for loads over 120 lb.: Malleable center hung Grinnell Fig. 228.
 - b. Side beam clamp with retaining clips - for loads up to 120 lb.
- C. Cast in Place Concrete Inserts:
1. Provide inserts selected for applied load of present load plus 100% for future, and coordinated with concrete work. Except as detailed on drawings, inserts shall be Unistrut or Grinnell. Plan, lay out and coordinate setting of inserts prior to concrete pour. Use Grinnell Fig. 285 lightweight concrete insert for loads up to 400# or Grinnell Fig. 281 Wedge Type concrete insert for loads up to 1200#
- D. Drilled Insert Anchors:
1. Where plumbing work cannot be supported from structural steel, or cast in place concrete inserts, provide drilled concrete insert anchors. Submit for approval, project specific installation drawings for all loads over 100 lbs. Install inserts in web of beam if possible and approved. Insert depth shall not exceed two thirds the thickness of the concrete. Where existing concrete appears to be deteriorating, or where applied load at insert exceeds 1000 lbs., conduct test of concrete to determine derated capacity of insert.

Anchors may be adhesive or expansion type up to 1000 lbs., and shall be adhesive type for loads over 1000 lbs.

PART 3 EXECUTION

3.01 GENERAL

- A. Existing piping: when encountered during the course of work, protect, brace and support existing piping where required for proper execution of the work.
- B. Interruption of existing active piping: when the course of work makes shut-down of services unavoidable, the plumbing contractor shall schedule the shut-down at such time as approved by the owners representative, which will cause least interference with established operating routine.
- C. Arrange work accordingly, providing such fittings as duct transitions traps, valves and accessories necessary to complete all construction in an orderly fashion.
- D. Install all equipment in strict accordance all directions and recommendations furnished by the manufacturer.

3.02 INTERPRETATION OF CONTRACT DOCUMENTS

- A. Should there be discrepancy or a question of intent, refer matter to Architect/Engineer for decision before ordering any equipment or materials or before starting any related work.
- B. Drawings and Specifications are to be taken together. Work specified and not shown or work shown and not specified shall be performed or furnished as though mentioned in both Specifications and Drawings. If there is discrepancy between Drawings and Specifications as to quantity or quality to be provided, the greater quantity or better quality shall be provided.
- C. Minor items and accessories or devices reasonably inferable as necessary to complete and proper installation and operation of any system shall be provided by Contractor for such system whether or not specifically called for by Specifications or Drawings.
- D. Architect/Engineer may change location of any equipment 5' and any piping, ductwork, conduit, etc. 10' in any direction without extra charge, provided such changes are made before installation.
- E. Locations of items not definitely fixed by dimensions are approximate only and exact locations necessary to secure the best conditions and results shall be determined at the site and shall be subject to review and approval by Architect/Engineer.
- F. Follow drawings in laying out work, check drawings of other trades to verify spaces in which work will be installed, and maintain maximum headroom and space conditions at all points.
 - 1. Where headroom or space conditions appear inadequate, notify Architect or Owner's field representative before proceeding with installation.
 - 2. Pipe/duct rerouting and size changes shall be made at no additional cost to the Owner.
- G. Furnish advance information on locations and sizes of frames, boxes, sleeves and openings needed for the work, and also furnish information and shop drawings necessary to permit installation of other work without delay.
- H. Where there is evidence that parts of the Work specified in Divisions 21, 22, and 23 will interfere with other work, assist in working out space conditions to make satisfactory adjustments, revise and submit coordinated shop drawings.
- I. After review and without additional cost to the Owner, make minor modifications in the work as required by structural interferences, by interferences with work of other sections or for proper execution of the work.
- J. Work installed before coordinating with other work so as to cause interference with other work shall be changed and corrected without additional cost to the Owner.

- K. Drawings are diagrammatic in nature and are a graphic representation of requirements and shall be followed as closely as actual building construction will permit. All changes from the plans necessary to make the work conform to the building as constructed and to fit the work of other trades or to conform to rules of the Governmental Authorities having jurisdiction, NFPA, OSHA and the Owner's Insurance Underwriters, shall be made by the Contractor without extra cost to the Owner.
- L. The layout of the piping, ductwork, equipment, etc., as shown on the drawings shall be checked and exact locations shall be determined by the dimensions of the equipment approved and the Contractor shall obtain approval for the revised layout before the apparatus is installed. The Contractor shall field measure or consult existing record Architectural and Structural Drawings if available for all dimensions, locations of partitions, locations and sizes of structural supports, foundations, etc.
- M. Omission in the Drawings and/or Specifications of any items necessary for the proper completion or operation of the work outlined in this specification shall not relieve the Contractor from furnishing same without additional cost to the Owner.
- N. The Equipment Shop Drawings should be furnished to the installing Contractor by the purchasing Contractor before roughing in. Contractor shall not install any piping or ductwork for said equipment until he has received approved shop drawings for same.

3.03 ALTERATIONS IN PRESENT BUILDING AND SYSTEMS

- A. Contractor shall take particular note of the revisions and alterations to the existing systems, facilities and equipment due to the new construction as indicated on the Drawings and/or in Specification. Contractor shall remove, reroute or alter all services, ductwork, etc., as required or as indicated on the drawings.
- B. The Contractor shall maintain all services in the existing building. In case, where new service connections are to be made to existing services and service interruptions can in no way be avoided, the service interruptions shall be with the minimum of inconvenience to the Owner and the work shall be done at such time of any day, Saturday and Sunday included, and only as directed by the Owner or the Architect.

3.04 ACCESSIBILITY

- A. Do not locate traps, valves, controls, unions, cleanouts, etc. in any system at a location that will be inaccessible after construction is completed. Maintain accessibility for all components in plumbing systems.

3.05 ACCESS PANELS:

- A. Refer to Division 08 - Openings; Provide access doors in locations as required by applicable codes and as indicated below. Coordinate locations with architectural trades.
- B. Submit shop drawings for review before ordering panels. Where fire rating is required, furnish label doors compatible with fire rating of assembly.
- C. Contractor shall confer with other trades with respect to access panel locations, and shall wherever practical group valves, traps, dampers, etc. in such way as to be accessible from single panel and eliminate as many access panels as possible.
- D. Furnish access panels to access valves, traps, control valves or devices, dampers, damper motors, etc. Access panels shall be sized as necessary for ample access, or as indicated on drawings, but no smaller than 12" x 12" where devices are within easy reach of operator, and at least 24"x24" when operator must pass through opening in order to reach the devices. Architectural Trades shall install access panels coordinated with Mechanical Trades.
- E. Access panels in fire rated walls or ceiling must be U.L. labeled for intended use. Unless otherwise indicated on plans, access doors shall be hinged flush type steel framed panel, 14 gauge minimum for frame, and with anchor straps. Only narrow border shall be exposed.

Hinges shall be concealed type. Locking device shall be flush type and screw driver operated. Metal surfaces shall be prime coated with rust-inhibitive paint. Panels shall be compatible with architectural adjacent materials.

3.06 PROTECTION OF ELECTRICAL EQUIPMENT

- A. Contractor shall furnish and install sheet metal drain pans beneath piping that is routed above electrical equipment and/or above the 3' access space in front of such equipment. Electrical equipment, for the purpose of addressing drain pan requirements, shall be defined as free-standing or wall-mounted switchgear, transformers, distribution boards or motor control centers.
 - 1. Drain pans shall be 20 gauge galvanized sheet metal with a minimum 4" high turned up edge. Bottom of drain pan shall slope to a single drainage point at $\frac{1}{8}$ " per foot. A 1" diameter clear plastic tube shall allow collected fluid to drain to the nearest open site floor drain. Secure plastic tubing to building structure only.
 - 2. Drain pan shall be hung from building structure with angle iron trapeze hangers (no hanger shall penetrate the drain pan). Consider drain pan to be full of water for hanger load calculations.
 - 3. Drain pans shall include liquid detectors with alarms only if noted on the drawings. Liquid detectors shall be specified in Section 22 10 06 Plumbing Piping Specialties.
- B. Contractor shall include provisions to adjust the local lighting layout, at no extra cost to Owner, in order to accommodate any detrimental effect the drain pan has on the illumination of the electrical equipment and access space.

3.07 CUTTING, PATCHING AND DAMAGE TO OTHER WORK

- A. Refer to Division 01 - General Requirements.
- B. All cutting required shall be done by the contractor whose work is involved, without extra cost the owner. All patching and restoration including the furnishing and installation of access panels in ceiling, walls; etc. Within the building lines shall be done by the respective, responsible contractor. No cutting of structural steel, concrete, or wood shall be done without prior approval and explicit directions of the architect patched by the respective, responsible contractor.
- C. The contractor, under whose jurisdiction the work may fall, shall provide labor, material, and tools required to cut, repair, protect, cap, or relocate existing pipes, conduits, or utilities interfering with or uncovered during work, per regulations of the authorities having jurisdiction.

3.08 EXCAVATION AND BACKFILLING

- A. Provide all excavation, trenching, tunneling, removal of materials, de-watering and backfilling required for the proper laying of pipes and plumbing work. Coordinate the work with other excavating and backfilling in same area.

3.09 ROUGH-IN FOR CONNECTION TO EQUIPMENT

- A. It shall be the responsibility of each contractor to study the architectural, structural, electrical, and mechanical drawings, conferring with the various trades involved and checking with the supplier of equipment in order to properly rough-in for all equipment.

3.10 MATERIAL AND EQUIPMENT

- A. All material and equipment shall be new and of the best quality used for the purpose in good commercial practice, and shall be the standard product of reputable manufacturers. The material and equipment must meet approval of state and local codes in the area it is being used. Roof decks shall not be used to support piping, conduit, equipment, devices, etc.

3.11 SEAL PENETRATIONS

- A. Seal the space around pipes in sleeves and around duct openings through walls, floors and ceilings. Provide adequate clearance to allow for proper sealing.

3.12 SOUND CONTROL

- A. Penetrations shall be maintained airtight to prevent sound transfer.
- B. Piping shall pass through sleeves. Pack sleeves tight with glass fiber or oakum and caulked on both sides with non-hardening acoustical sealant.

3.13 FIRESTOPPING

- A. Refer to Division 07 - Thermal and Moisture Protection for more information.
- B. Provide UL classified firestopping system for plumbing penetrations through rated walls and floors to maintain the fire rating.

3.14 CONTROL WIRING

- A. All control wiring for plumbing and electrical equipment, including motor starters, shall be 120 volt maximum and wired with one side of the coil grounded and the operating contacts in the north side of the circuit. All control wiring shall be installed in conduit.

3.15 CLEANING, FLUSHING, AND INSPECTING

- A. Refer to Division 01 - General Requirements; all plumbing equipment and components shall be cleaned as frequently as necessary through the construction process and again prior to project completion.
- B. Clean exterior surfaces of installed piping systems of superfluous materials and prepare for application of specified coatings (if any). Flush out piping systems with clean water before proceeding with required tests. Inspect each run of each system for completion of joints, supports and accessory items.
- C. Sufficient flushing water shall be introduced into the mains to produce a velocity of not less than 4' per second and this flow rate shall be continued until the discharge is clean and clear and does not show evidences of silt or foreign matter when a sample is visually inspected.
- D. Inspect pressure piping in accordance with procedures of ASME B31.

3.16 DELIVERY, STORAGE AND PROTECTION OF EQUIPMENT AND MATERIALS

- A. Refer to Division 01 - General Requirements; all equipment and materials shall be delivered, stored and secured per manufacturer's recommendations.
- B. On-site storage shall be coordinated with Construction Manager/General Contractor and be performed in a manner as to avoid damage, deterioration and loss.
- C. Contractor shall provide temporary protection for installed equipment prior to project completion.
- D. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- E. All equipment shall be inspected prior to installation to assure that equipment is free from defect and damage.
- F. Protect plumbing fixtures and piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

3.17 PIPING TESTS

- A. Test pressure piping in accordance with ASME B31.
- B. General: Provide temporary equipment for testing, including pump and gauges. Test piping systems before insulation is installed wherever feasible and remove control devices before testing. Test each natural section of each piping system independently, but do not use piping system valves to isolate sections where test pressure exceeds valve pressure rating. Fill each section with water and pressurize for indicated pressure and time.

1. Test each piping system at 150% of operating pressure, or other pressure as required by Authority Having Jurisdiction, whichever is greater.
 - a. Domestic water systems and equipment vents shall be tested hydrostatically for minimum of four hours at 1½ times design pressure for that system, or 100 psig minimum, whichever is greater, unless otherwise specified.
 - b. Storm, soil, waste and vent piping shall be tested with water for minimum of 24 hours at 10 feet head.
 - c. Acid resistant waste and vent systems shall be tested as per manufacturer's recommendations.
 2. Observe each test section for leakage at end of test period. Test fails if leakage is observed or if pressure drop exceeds 5% of test pressure.
- C. Repair piping systems sections which fail required piping test, by disassembly and re-installation, using new materials to extent required to overcome leakage. Do not use chemicals, stop-leak compounds, mastics or other temporary repair methods.
- D. Drain test water from piping systems after testing and repair work has been completed.

**SECTION 220505
SELECTIVE DEMOLITION FOR PLUMBING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Demolition and extension of existing plumbing work.

1.02 RELATED REQUIREMENTS

- A. Division 01 - General Requirements: Project administrative and procedural requirements.
- B. Division 02 - Existing Conditions: Demolition, cleaning and disposal requirements, cutting and patching requirements, repairs.

1.03 SUMMARY

- A. The work covered under this section consists of the furnishing of all necessary labor, supervision, materials, equipment, and services to completely execute the system of minor electrical demolition as described in this specification.
- B. The demolition documents plans and specification have been prepared from existing non-as built documents and cursory non-invasive field investigation.
- C. It is the contractors obligation to become familiar with the extent of demolition and the existing condition before submitting their bid.
- D. During demolition if the contractor discovers unforeseen significant non-code compliance conditions of the existing installation they shall notify the Architect and Engineer immediately in writing.
- E. The contractor shall become familiar with the drawings and scope of work of other trades as the work scope of those trades relates to mechanical equipment and connection requirements.
- F. During demolition the contractor shall record on site as-builts all plumbing sanitary, waste and domestic hot, cold and hot water recirculation capped branches for reuse in renovated project space.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Materials and equipment for patching and extending work: As specified in individual sections.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that piping to be demolished serve only equipment and facilities within the demolition areas.
- B. Demolition drawings are based on casual field observation and existing record documents.
- C. Report discrepancies to Owner before disturbing existing installation.
- D. Beginning of demolition means installer accepts existing conditions.

3.02 PREPARATION

- A. Identify locations for capping plumbing piping before any demolition work commences.
- B. Coordinate utility service shut-downs with Utility Companies.
- C. Provide temporary connections to maintain existing systems in service during construction.
- D. Confirm isolation valve locations for domestic water piping. Repair leaking isolation valves or replace inoperable valves before commencing piping demolition.

3.03 DEMOLITION AND EXTENSION OF EXISTING PLUMBING WORK

- A. In general plumbing remodeling work is shown on Drawings but carefully study all drawings for all contracts for "demolition" and "remodeling" work in existing building and field check to verify locations where such work is being done to determine exact extent of work required. No extra will be allowed for additional work required because of demolition or remodeling whether or not work is specifically noted, itemized or shown on Drawings.
- B. Remove existing equipment and materials pertaining to contract as specified or as required, whether shown on Drawings or not, to prepare for new work of all contracts.
- C. Where necessary, reroute piping, ducts, etc. from within walls, floors, ceilings, etc. being removed. Contractor involved with interrupted service shall be responsible for accomplishing required work whether shown on Drawings or not.
- D. Remove, relocate, and extend existing plumbing piping to accommodate new construction.
- E. Remove domestic water piping back to main and provide isolation valve and cap. DEAD LEGS ARE NOT ALLOWED.
- F. Remove sanitary and waste piping to branch connection fitting to negate any dead legs.

3.04 CLEANING AND REPAIR

- A. Refer to Division 01 - General Requirements for procedures.
- B. Clean and repair existing materials and equipment that remain or that are to be reused.

**SECTION 220517
SLEEVES AND SLEEVE SEALS FOR PLUMBING PIPING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Pipe sleeves.
- B. Manufactured sleeve-seal systems.

1.02 RELATED REQUIREMENTS

- A. Section 078400 - Firestopping.

1.03 REFERENCE STANDARDS

- A. ASTM C592 - Standard Specification for Mineral Fiber Blanket Insulation and Blanket-Type Pipe Insulation (Metal-Mesh Covered) (Industrial Type); 2022a.
- B. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems; 2023a.

PART 2 PRODUCTS

2.01 PIPE SLEEVES

- A. Sheet Metal: Pipe passing through interior walls, partitions, and floors, unless steel or brass sleeves are specified below.
- B. Clearances:
 - 1. Provide allowance for insulated piping.
 - 2. All Rated Openings: Caulked tight with fire stopping material complying with ASTM E814 in accordance with Section 078400 to prevent the spread of fire, smoke, and gases.

2.02 MANUFACTURED SLEEVE-SEAL SYSTEMS

- A. Modular/Mechanical Seal:
 - 1. Synthetic rubber interlocking links continuously fill annular space between pipe and wall/casing opening.
 - 2. Provide watertight seal between pipe and wall/casing opening.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Route piping in orderly manner, plumb and parallel to building structure. Maintain gradient.
- B. Install piping to conserve building space, to not interfere with use of space and other work.
- C. Install piping and pipe sleeves to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- D. When installing more than one piping system material, ensure system components are compatible and joined to ensure the integrity of the system. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.

**SECTION 220519
METERS AND GAUGES FOR PLUMBING PIPING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Pressure gauges and pressure gauge taps.
- B. Thermometers and thermometer wells.

1.02 REFERENCE STANDARDS

- A. ASME B40.100 - Pressure Gauges and Gauge Attachments 2013.
- B. ASTM E1 - Standard Specification for ASTM Liquid-in-Glass Thermometers 2014.
- C. ASTM E77 - Standard Test Method for Inspection and Verification of Thermometers 2014, with Editorial Revision (2017).
- D. UL 393 - Indicating Pressure Gauges for Fire-Protection Service Current Edition, Including All Revisions.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide list that indicates use, operating range, total range and location for manufactured components.

1.04 FIELD CONDITIONS

- A. Do not install instrumentation when areas are under construction, except for required rough-in, taps, supports and test plugs.

PART 2 PRODUCTS

2.01 PRESSURE GAUGES

- A. Pressure Gauges: ASME B40.100, UL 393 drawn steel case, phosphor bronze bourdon tube, rotary brass movement, brass socket, with front recalibration adjustment, black scale on white background.
 - 1. Case: Steel with brass bourdon tube.
 - 2. Size: 4-1/2 inch diameter.
 - 3. Mid-Scale Accuracy: One percent.
 - 4. Scale: Psi and kPa.

2.02 PRESSURE GAUGE TAPPINGS

- A. Gauge Cock: Tee or lever handle, brass for maximum 150 psi.

2.03 STEM TYPE THERMOMETERS

- A. Thermometers - Adjustable Angle: Red- or blue-appearing non-toxic liquid in glass; ASTM E1; lens front tube, cast aluminum case with enamel finish, cast aluminum adjustable joint with positive locking device; adjustable 360 degrees in horizontal plane, 180 degrees in vertical plane.
 - 1. Size: 9 inch scale.
 - 2. Window: Clear Lexan.
 - 3. Accuracy: 2 percent, per ASTM E77.
 - 4. Calibration: Degrees F.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.

- B. Install pressure gauges with pulsation dampers. Provide gauge cock to isolate each gauge. Extend nipples to allow clearance from insulation.
- C. Install gauges and thermometers in locations where they are easily read from normal operating level. Install vertical to 45 degrees off vertical.
- D. Adjust gauges and thermometers to final angle, clean windows and lenses, and calibrate to zero.

3.02 SCHEDULES

- A. Pressure Gauges, Location and Scale Range:
 - 1. Pumps, 0 to 120 psi.
 - 2. Pressure reducing valves, 0 to 120 psi.
- B. Stem Type Thermometers, Location and Scale Range:
 - 1. Domestic hot water supply and recirculation, 0 to 180 degrees F.

SECTION 220553
IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Nameplates.
- B. Pipe markers.

1.02 REFERENCE STANDARDS

- A. ASME A13.1 - Scheme for the Identification of Piping Systems 2020.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturers catalog literature for each product required.

PART 2 PRODUCTS

2.01 IDENTIFICATION APPLICATIONS

- A. Piping: Pipe markers.
- B. Pumps: Nameplates.
- C. Equipment and Tanks: Nameplates.
- D. Valves: Tags.

2.02 NAMEPLATES

- A. Manufacturers:
 - 1. Brimar Industries, Inc: www.pipemarker.com/#sle.
 - 2. Kolbi Pipe Marker Co: www.kolbipipemarkers.com/#sle.
 - 3. Seton Identification Products: www.seton.com/#sle.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Description: Laminated three-layer plastic with engraved letters.

2.03 TAGS

- A. Manufacturers:
 - 1. Brimar Industries, Inc: www.pipemarker.com/#sle.
 - 2. Kolbi Pipe Marker Co: www.kolbipipemarkers.com/#sle.
 - 3. Seton Identification Products: www.seton.com/#sle.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch diameter with smooth edges.

2.04 PIPE MARKERS

- A. Manufacturers:
 - 1. Brimar Industries, Inc: www.pipemarker.com/#sle.
 - 2. Kolbi Pipe Marker Co: www.kolbipipemarkers.com/#sle.
 - 3. Seton Identification Products: www.seton.com/#sle.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Comply with ASME A13.1.
- C. Plastic Pipe Markers: Factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.

- D. Underground Plastic Pipe Markers: Bright colored continuously printed plastic ribbon tape, minimum 6 inches wide by 4 mil thick, manufactured for direct burial service.

PART 3 EXECUTION

3.01 PREPARATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.

3.02 INSTALLATION

- A. Install plastic nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.
- B. Install tags with corrosion resistant chain.
- C. Install plastic pipe markers in accordance with manufacturer's instructions.
 - 1. Install in clear view and align with axis of piping.
 - 2. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and Tee, at each side of penetration of structure or enclosure, and at each obstruction.
- D. Install underground plastic pipe markers 6 to 8 inches below finished grade, directly above buried pipe.

**SECTION 220719
PLUMBING PIPING INSULATION**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Piping insulation.
- B. Jackets and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 07 8400 - Firestopping.
- B. Section 22 1005 - Plumbing Piping: Placement of hangers and hanger inserts.

1.03 REFERENCE STANDARDS

- A. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus 2019.
- B. ASTM C195 - Standard Specification for Mineral Fiber Thermal Insulating Cement 2007 (Reapproved 2013).
- C. ASTM C534/C534M - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form 2020a.
- D. ASTM C547 - Standard Specification for Mineral Fiber Pipe Insulation 2019.
- E. ASTM C795 - Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel 2008 (Reapproved 2018).
- F. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2021.
- G. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials 2016.
- H. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

- A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

2.02 GLASS FIBER

- A. Manufacturers:
 - 1. CertainTeed Corporation: www.certainteed.com/#sle.
 - 2. Johns Manville Corporation: www.jm.com/#sle.
 - 3. Knauf Insulation: www.knaufinsulation.com/#sle.
 - 4. Owens Corning Corporation: www.ocbuildingspec.com/#sle.
 - 5. Substitutions: See Section 01 6000 - Product Requirements.
- B. Insulation: ASTM C547 and ASTM C795; rigid molded, noncombustible.
 - 1. K Value: ASTM C177, 0.24 at 75 degrees F.
 - 2. Maximum Service Temperature: 850 degrees F.
 - 3. Maximum Moisture Absorption: 0.2 percent by volume.

- C. Vapor Barrier Jacket: White Kraft paper with glass fiber yarn, bonded to aluminized film; moisture vapor transmission when tested in accordance with ASTM E96/E96M of 0.02 perm-inches.
- D. Tie Wire: 0.048 inch stainless steel with twisted ends on maximum 12 inch centers.
- E. Vapor Barrier Lap Adhesive: Compatible with insulation.
 - 1. Vapor Barrier Lap Adhesive shall be compatible with the insulation and as recommended by the insulation manufacturer.
- F. Insulating Cement/Mastic: ASTM C195; hydraulic setting on mineral wool.
- G. Indoor Vapor Barrier Finish:
 - 1. Vinyl emulsion type acrylic, compatible with insulation, white color.

2.03 FLEXIBLE ELASTOMERIC CELLULAR INSULATION

- A. Manufacturers:
 - 1. Aeroflex USA, Inc: www.aeroflexusa.com/#sle.
 - 2. Armacell LLC: www.armacell.us/#sle.
 - 3. K-Flex USA LLC: www.kflexusa.com/#sle.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Insulation: Preformed flexible elastomeric cellular rubber insulation complying with ASTM C534/C534M Grade 1; use molded tubular material wherever possible.
 - 1. Minimum Service Temperature: Minus 40 degrees F.
 - 2. Maximum Service Temperature: 220 degrees F.
 - 3. Connection: Waterproof vapor barrier adhesive.
- C. Elastomeric Foam Adhesive: Air dried, contact adhesive, compatible with insulation.

2.04 JACKETS

- A. PVC Plastic.
 - 1. Manufacturers:
 - a. Johns Manville Corporation: www.jm.com/#sle.
 - b. Proto Corporation: www.protocorporation.com.
 - c. Substitutions: See Section 01 6000 - Product Requirements.
 - 2. Jacket: One piece molded type fitting covers and sheet material, off-white color.
 - a. Minimum Service Temperature: 0 degrees F.
 - b. Maximum Service Temperature: 150 degrees F.
 - c. Moisture Vapor Permeability: 0.002 perm inch, maximum, when tested in accordance with ASTM E96/E96M.
 - d. Thickness: 10 mil.
 - e. Connections: Brush on welding adhesive.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that piping has been tested before applying insulation materials.
- B. Verify that surfaces are clean and dry, with foreign material removed.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install in accordance with North American Insulation Manufacturers Association (NAIMA) National Insulation Standards.
- C. Exposed Piping: Locate insulation and cover seams in least visible locations.

- D. Insulated pipes conveying fluids below ambient temperature: Insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.
- E. Glass fiber insulated pipes conveying fluids below ambient temperature:
 - 1. Provide vapor barrier jackets, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples and vapor barrier mastic.
 - 2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor barrier adhesive or PVC fitting covers.
- F. Glass fiber insulated pipes conveying fluids above ambient temperature:
 - 1. Provide standard jackets, with or without vapor barrier, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples.
 - 2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe. Finish with glass cloth and adhesive or PVC fitting covers.
- G. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions.
- H. Heat Traced Piping: Insulate fittings, joints, and valves with insulation of like material, thickness, and finish as adjoining pipe. Size large enough to enclose pipe and heat tracer. Cover with aluminum jacket with seams located on bottom side of horizontal piping.

3.03 SCHEDULES

- A. Plumbing Systems:
 - 1. Domestic Hot Water Supply & Recirculation:
 - a. Pipe Size Range: 1/2 to 1-1/4 inch
 - 1) Thickness: 1 inch
 - b. Pipe Size Range: 1-1/2 to 8 inch
 - 1) Thickness: 1-1/2 inch
 - 2. Domestic Cold Water: 1 inch thick.
 - 3. Roof Drain Bodies: 1/2 inch thick.
 - 4. Roof Drainage Above Grade: 1/2 inch thick with PVC jacket.
 - 5. Plumbing Vents Within 10 Feet of the Exterior: 1/2 inch thick with PVC jacket.
- B. Cooling Systems:
 - 1. Condensate Drains from Cooling Coils: 1 inch thick.
- C. Other Systems:
 - 1. Piping Exposed to Freezing with Heat Tracing: 1 inch or as recommended by heat tracing manufacturer.

**SECTION 221005
PLUMBING PIPING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Pipe, pipe fittings, specialties, and connections for piping systems.
 - 1. Sanitary sewer.
 - 2. Domestic water.
 - 3. Flanges, unions, and couplings.
 - 4. Pipe hangers and supports.
 - 5. Valves.
 - 6. Check.

1.02 RELATED REQUIREMENTS

- A. Section 220553 - Identification for Plumbing Piping and Equipment.
- B. Section 220719 - Plumbing Piping Insulation.

1.03 REFERENCE STANDARDS

- A. ASME B16.3 - Malleable Iron Threaded Fittings: Classes 150 and 300; 2016.
- B. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; 2018.
- C. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; 2018.
- D. ASME B31.9 - Building Services Piping; 2017.
- E. ASME BPVC-IV - Boiler and Pressure Vessel Code, Section IV - Rules for Construction of Heating Boilers; 2023.
- F. ASME BPVC-IX - Qualification Standard for Welding, Brazing, and Fusing Procedures; Welders; Brazers; and Welding, Brazing, and Fusing Operators - Welding Brazing and Fusing Qualifications; 2019.
- G. ASSE 1003 - Water Pressure Reducing Valves for Potable Water Distribution Systems; 2023.
- H. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2018.
- I. ASTM A74 - Standard Specification for Cast Iron Soil Pipe and Fittings; 2021.
- J. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service; 2019.
- K. ASTM B32 - Standard Specification for Solder Metal; 2008 (Reapproved 2014).
- L. ASTM B88 - Standard Specification for Seamless Copper Water Tube; 2016.
- M. ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric); 2018.
- N. ASTM B813 - Standard Specification for Liquid and Paste Fluxes for Soldering of Copper and Copper Alloy Tube; 2016.
- O. ASTM B828 - Standard Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings; 2023.
- P. ASTM C564 - Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings; 2020a.
- Q. ASTM D2564 - Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems; 2020.
- R. ASTM D2665 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings; 2020.

- S. ASTM D2729 - Standard Specification for Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings; 2021.
- T. ASTM D2855 - Standard Practice for the Two-Step (Primer & Solvent Cement) Method of Joining Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Piping Components with Tapered Sockets; 2015.
- U. ASTM D3034 - Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings; 2023.
- V. AWWA C651 - Disinfecting Water Mains; 2014, with Addendum (2020).
- W. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2018.
- X. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends; 2010, with Errata .

1.04 SUBMITTALS

- A. Product Data: Provide data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.
- B. Welder Certificate: Include welders certification of compliance with ASME BPVC-IX.
- C. Sustainable Design Documentation: For soldered copper joints, submit installer's certification that the specified installation method and materials were used.
- D. Project Record Documents: Record actual locations of valves.

1.05 QUALITY ASSURANCE

- A. Perform work in accordance with applicable codes.
- B. Welding Materials and Procedures: Comply with ASME BPVC-IX and applicable state labor regulations.
- C. Welder Qualifications: Certified in accordance with ASME BPVC-IX.

1.06 FIELD CONDITIONS

- A. Do not install underground piping when bedding is wet or frozen.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Potable Water Supply Systems: Provide piping, pipe fittings, and solder and flux (if used), that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.

2.02 SANITARY SEWER PIPING, BURIED WITHIN 5 FEET (____) OF BUILDING

- A. Cast Iron Pipe: ASTM A74 extra heavy weight.
 - 1. Fittings: Cast iron.
 - 2. Joints: Hub-and-spigot, CISPI HSN compression type with ASTM C564 neoprene gaskets or lead and oakum.
- B. PVC Pipe: ASTM D2665 or ASTM D3034.
 - 1. Fittings: PVC.
 - 2. Joints: Solvent welded, with ASTM D2564 solvent cement.

2.03 SANITARY SEWER PIPING, ABOVE GRADE

- A. Cast Iron Pipe: ASTM A74, service weight.
 - 1. Fittings: Cast iron.
 - 2. Joint Seals: ASTM C564 neoprene gaskets, or lead and oakum.
- B. PVC Pipe: ASTM D2729.

1. Fittings: PVC.
2. Joints: Solvent welded, with ASTM D2564 solvent cement.

2.04 DOMESTIC WATER PIPING, ABOVE GRADE

- A. Copper Tube: ASTM B88 (ASTM B88M), Type L (B), Drawn (H).
1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze.
 2. Fittings: Cast iron, coated.
 3. Joints: ASTM B32, alloy Sn95 solder.
 4. Mechanical Press Sealed Fittings: Double pressed type, NSF 61 and NSF 372 approved or certified, utilizing EPDM, non toxic synthetic rubber sealing elements.

2.05 PIPE HANGERS AND SUPPORTS

- A. Provide hangers and supports that comply with MSS SP-58.
1. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.
 2. Overhead Supports: Individual steel rod hangers attached to structure or to trapeze hangers.
 3. Trapeze Hangers: Welded steel channel frames attached to structure.
 4. Vertical Pipe Support: Steel riser clamp.
- B. Plumbing Piping - Water:
1. Hangers for Pipe Sizes 1/2 Inch (15 mm) to 1-1/2 Inches (40 mm): Malleable iron, adjustable swivel, split ring.
 2. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.

2.06 BALL VALVES

- A. Manufacturers:
1. Tyco flow control: www.tycoflowcontrol.com
 2. Nibco, Inc: www.nibco.com
 3. Milwaukee Valve Company: www.milwaukeevalve.com
- B. Construction, 4 Inches (100 mm) and Smaller: MSS SP-110, Class 150, 400 psi (2760 kPa) CWP, bronze body, chrome plated brass ball, regular port, teflon seats and stuffing box ring, blow-out proof stem, lever handle with balancing stops, solder ends with union.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that excavations are to required grade, dry, and not over-excavated.

3.02 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and dirt, on inside and outside, before assembly.
- C. Prepare piping connections to equipment with flanges or unions.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Provide non-conducting dielectric connections wherever jointing dissimilar metals.
- C. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.
- D. Install piping to maintain headroom, conserve space, and not interfere with use of space.
- E. Group piping whenever practical at common elevations.

- F. Establish elevations of buried piping outside the building to ensure not less than 4 ft (____ m) of cover.
- G. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.
- H. Install valves with stems upright or horizontal, not inverted. Refer to Section 220523.
- I. Copper Pipe and Tube: Make soldered joints in accordance with ASTM B828, using specified solder, and flux meeting ASTM B813; in potable water systems use flux also complying with NSF 61 and NSF 372.
- J. PVC Pipe: Make solvent-welded joints in accordance with ASTM D2855.
- K. Sleeve pipes passing through partitions, walls and floors.
- L. Inserts:
 - 1. Provide inserts for placement in concrete formwork.
 - 2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
 - 3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches (100 mm).
 - 4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
 - 5. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut above slab.
- M. Pipe Hangers and Supports:
 - 1. Install in accordance with ASME B31.9.
 - 2. Support horizontal piping as indicated.
 - 3. Install hangers to provide minimum 1/2 inch (15 mm) space between finished covering and adjacent work.
 - 4. Place hangers within 12 inches (300 mm) of each horizontal elbow.
 - 5. Use hangers with 1-1/2 inch (40 mm) minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
 - 6. Support vertical piping at every other floor. Support riser piping independently of connected horizontal piping.
 - 7. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
 - 8. Provide copper plated hangers and supports for copper piping.
 - 9. Prime coat exposed steel hangers and supports. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.
 - 10. Support cast iron drainage piping at every joint.

3.04 APPLICATION

- A. Install unions downstream of valves and at equipment or apparatus connections.
- B. Install brass male adapters each side of valves in copper piped system. Solder adapters to pipe.
- C. Install ball valves for shut-off and to isolate equipment, part of systems, or vertical risers.

3.05 TOLERANCES

- A. Drainage Piping: Establish invert elevations within 1/2 inch (10 mm) vertically of location indicated and slope to drain at minimum of 1/8 inch per foot (1:100) slope.
- B. Water Piping: Slope at minimum of 1/32 inch per foot (1:400) and arrange to drain at low points.

3.06 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

- A. Prior to starting work, verify system is complete, flushed and clean.
- B. Ensure acidity (pH) of water to be treated is between 7.4 and 7.6 by adding alkali (caustic soda or soda ash) or acid (hydrochloric).
- C. Inject disinfectant, free chlorine in liquid, powder, tablet or gas form, throughout system to obtain 50 to 80 mg/L residual.
- D. Bleed water from outlets to ensure distribution and test for disinfectant residual at minimum 15 percent of outlets.
- E. Maintain disinfectant in system for 24 hours.
- F. If final disinfectant residual tests less than 25 mg/L, repeat treatment.
- G. Flush disinfectant from system until residual equal to that of incoming water or 1.0 mg/L.
- H. Take samples no sooner than 24 hours after flushing, from 10 percent of outlets and from water entry, and analyze in accordance with AWWA C651.

3.07 SCHEDULES

- A. Pipe Hanger Spacing:
 - 1. Metal Piping:
 - a. Pipe Size: 1/2 inches (15 mm) to 1-1/4 inches (32 mm):
 - 1) Maximum Hanger Spacing: 6.5 ft (2 m).
 - 2) Hanger Rod Diameter: 3/8 inches (9 mm).

**SECTION 221006
PLUMBING PIPING SPECIALTIES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Drains.
- B. Cleanouts.
- C. Hose bibbs.
- D. Air admittance valves.
- E. Backflow preventers.
- F. Water hammer arrestors.
- G. Air Vents.
- H. Trap seals.

1.02 RELATED REQUIREMENTS

- A. Section 22 1005 - Plumbing Piping.
- B. Section 22 3000 - Plumbing Equipment.
- C. Section 22 4000 - Plumbing Fixtures.

1.03 REFERENCE STANDARDS

- A. ASME A112.6.3 - Floor and Trench Drains 2019.
- B. ASME A112.6.4 - Roof, Deck, and Balcony Drains 2008 (Reaffirmed 2012).
- C. ASSE 1013 - Performance Requirements for Reduced Pressure Principle Backflow Preventers and Reduced Pressure Principle Fire Protection Backflow Preventers 2011.
- D. ASSE 1019 - Performance Requirements for Wall Hydrant with Backflow Protection and Freeze Resistance 2011 (Reaffirmed 2016).
- E. NSF 61 - Drinking Water System Components - Health Effects 2020.
- F. NSF 372 - Drinking Water System Components - Lead Content 2020.
- G. PDI-WH 201 - Water Hammer Arresters 2017.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide component sizes, rough-in requirements, service sizes, and finishes.
- C. Project Record Documents: Record actual locations of equipment, cleanouts, backflow preventers, water hammer arrestors, and other specialties applicable to project.
- D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.
 - 2. Extra Loose Keys for Outside Hose Bibbs: One.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Specialties in Potable Water Supply Systems: Provide products that comply with NSF 61 and NSF 372 for maximum lead content.

2.02 DRAINS

- A. Manufacturers:
 - 1. Jay R. Smith Manufacturing Company: www.jayrsmith.com/#sle.

2. Josam Company: www.josam.com/#sle.
 3. Zurn Industries, LLC: www.zurn.com/#sle.
 4. MIFAB: www.mifab.com.
 5. Watts: www.watts.com
 6. Substitutions: See Section 01 6000 - Product Requirements.
- B. Floor Drains:
1. ASME A112.6.3; lacquered cast iron or stainless steel, two piece body with double drainage flange, weep holes, and reversible clamping collar.
 2. Strainer: Refer to Plumbing Fixture Schedule for size, type and accessories.
- C. Floor Sinks:
1. Lacquered cast iron body with ABS anti-splash interior bottom dome strainer, light duty grate with slotted openings, white acid resisting porcelain enamel interior and top.
 2. Size: refer to Plumbing Fixture Schedule.
 3. Grate type: refer to Plumbing Fixture Schedule.
 4. Install with lip approximately 1" above finished floor, if required by AHJ.

2.03 CLEANOUTS

- A. Manufacturers:
1. Jay R. Smith Manufacturing Company: www.jayrsmith.com/#sle.
 2. MIFAB, Inc: www.mifab.com/#sle.
 3. Zurn Industries, LLC: www.zurn.com/#sle.
 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Cleanouts at Exterior Surfaced Areas
1. Round cast nickel bronze access frame and non-skid cover.
- C. Cleanouts at Exterior Unsurfaced Areas:
1. Line type with lacquered cast iron body and round epoxy coated gasketed cover.
- D. Cleanouts at Interior Finished Floor Areas:
1. Lacquered cast iron body with anchor flange, reversible clamping collar, threaded top assembly, and round gasketed scored cover in service areas and round gasketed depressed cover to accept floor finish in finished floor areas.
- E. Cleanouts at Interior Finished Wall Areas:
1. Line type with lacquered cast iron body and round epoxy coated gasketed cover, and round stainless steel access cover secured with machine screw.
- F. Cleanouts at Interior Unfinished Accessible Areas: Calked or threaded type. Provide bolted stack cleanouts on vertical rainwater leaders.

2.04 HOSE BIBBS

- A. Manufacturers:
1. Jay R. Smith Manufacturing Company: www.jayrsmith.com/#sle.
 2. Watts Regulator Company: www.wattsregulator.com/#sle.
 3. Zurn Industries, LLC: www.zurn.com/#sle.
 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Interior Hose Bibbs for Public Areas:
1. Moderate climate, anti-siphon narrow wall hydrant with chrome plated face, integral vacuum breaker, 3/4" hose connection, 360 degree swivel pipe connection with 3/4" female/1" male threads. Bronze head, seat casting, internal working parts, and loose key.
 2. Complies with ASSE 1019.

2.05 AIR ADMITTANCE VALVES

- A. Manufacturers:

1. IPS Corporation: Studor; www.ipscorp.com
 2. Sioux Chief: Turbo Vent; www.siouxchief.com
 3. Oatey: Sure Vent; www.oatey.com
 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Description: ASSE 1050 and 1051; Valve shall provide positive seal at 0 psi and under positive line pressure to prevent sewer gasses from entering the occupied space. ABS/PVC body with Schedule 40 adapter and actuating device.
- C. When device is located in a wall, provide with recessed access box with vented cover plate. Access box shall be fire rated when installing in fire rated walls. Refer to Architectural drawings.

2.06 BACKFLOW PREVENTERS

- A. Manufacturers:
1. Apollo Valves: www.apollovalves.com/#sle.
 2. Watts Regulator Company, a part of Watts Water Technologies: www.wattsregulator.com/#sle.
 3. Zurn Industries, LLC: www.zurn.com/#sle.
 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Reduced Pressure Backflow Preventers:
1. ASSE 1013; bronze body with bronze internal parts and stainless steel springs; two independently operating, spring loaded check valves; diaphragm type differential pressure relief valve located between check valves; third check valve that opens under back pressure in case of diaphragm failure; non-threaded vent outlet; assembled with two gate valves, strainer, and four test cocks.
 2. Provide with air gap fitting; pipe to adjacent floor drain receptor
 3. Device shall be approved for vertical installation.
- C. Double Check Valve Backflow Preventers:
1. ASSE 1012; Bronze body with corrosion resistant internal parts and stainless steel springs; two independently operating check valves with intermediate atmospheric vent.
- D. Dual Check Valve Backflow Preventers:
1. ANSI/ASSE 1024 bronze body with two compact replaceable check modules with Buna "N" seals and stainless steel springs and one union with seal.
- E. Carbonated Beverage Machine Backflow Preventers:
1. ASSE 1022 316 stainless steel dual check with atmospheric port designed for protection of the water supply from carbon dioxide gas and carbonated water. Atmospheric vent provides visual indication in the event the downstream check fails. Vent discharge shall be piped to an indirect waste receptor. Provide with wye pattern strainer.

2.07 WATER HAMMER ARRESTORS

- A. Manufacturers:
1. Jay R. Smith Manufacturing Company: www.jayrsmith.com/#sle.
 2. Watts Regulator Company, a part of Watts Water Technologies: www.wattsregulator.com/#sle.
 3. Zurn Industries, LLC: www.zurn.com/#sle.
 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Water Hammer Arrestors:
1. Stainless steel construction, bellows type sized in accordance with PDI-WH 201, precharged suitable for operation in temperature range 34 to 250 degrees F and maximum 150 psi working pressure.

2.08 AIR VENTS

- A. Manufacturers:
 - 1. Cash Acme, a brand of Reliance Worldwide Corporation: www.cashacme.com/#sle.
 - 2. ITT Bell & Gossett: www.bellgossett.com/#sle.
 - 3. Taco, Inc: www.taco-hvac.com/#sle.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Manual Type: Short vertical sections of 2 inch diameter pipe to form air chamber, with 1/8 inch brass needle valve at top of chamber.

2.09 FLOOR DRAIN TRAP SEALS

- A. Manufacturers:
 - 1. MIFAB, Inc: www.mifab.com/#sle.
 - 2. JR Smith: www.jrsmith.com.
 - 3. Zurn: www.zurn.com.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Description: Push-fit EPDM or silicone fitting with a one-way membrane. For use in floor drain outlets or the adjustable strainer throats to minimize evaporation of the trap seal.
- C. Standard: Required flow rates per ASSE 1072.
- D. Size: To match floor drain in which protection device is to be installed
- E. Do not use in applications where the room/space has atmospheric pressure less than ambient pressure of the exterior of the room/space or building

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Coordinate clean-out locations with Architect prior to installation.
- C. Extend cleanouts to finished floor or wall surface. Lubricate threaded cleanout plugs with mixture of graphite and linseed oil. Ensure clearance at cleanout for rodding of drainage system.
- D. Encase exterior cleanouts in concrete flush with grade.
- E. Install floor cleanouts at elevation to accommodate finished floor.
- F. Install approved potable water protection devices on plumbing lines where contamination of domestic water may occur; on boiler feed water lines, janitor rooms, fire sprinkler systems, premise isolation, irrigation systems, flush valves, interior and exterior hose bibbs.
- G. Pipe relief from backflow preventer to nearest drain.
- H. Install water hammer arrestors complete with accessible isolation valve on hot and cold water supply piping to any fixture or equipment with quick closing valves..
- I. Coordinate all electrical and controls requirements of leak detection system with Division 26 an Temperature Controls Contractor.

**SECTION 223000
PLUMBING EQUIPMENT**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Water Heaters:
 - 1. Commercial electric.
- B. Diaphragm-type compression tanks.
- C. In-line circulator pumps.

1.02 RELATED REQUIREMENTS

- A. Section 26 0583 - Wiring Connections: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

- A. ANSI Z21.10.1 - Gas Water Heaters - Volume I - Storage Water Heaters with Input Ratings of 75,000 Btu per Hour or Less 2014.
- B. ASME BPVC-VIII-1 - Boiler and Pressure Vessel Code, Section VIII, Division 1: Rules for Construction of Pressure Vessels 2019.
- C. ICC (IPC) - International Plumbing Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- D. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2020.
- E. UL 174 - Standard for Household Electric Storage Tank Water Heaters Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittals procedures.
- B. Product Data:
 - 1. Provide dimension drawings of water heaters indicating components and connections to other equipment and piping.
 - 2. Indicate pump type, capacity, power requirements.
 - 3. Provide certified pump curves showing pump performance characteristics with pump and system operating point plotted. Include NPSH curve when applicable.
 - 4. Provide electrical characteristics and connection requirements.
- C. Project Record Documents: Record actual locations of components.
- D. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
- E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.
 - 2. Extra Pump Seals: One of each type and size.
 - 3. Extra Water Softener Salt: 50 pounds.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.
- B. Certifications:
 - 1. All products in contact with potable water: NSF approved.
 - 2. Gas Water Heaters: Certified by CSA International to ANSI Z21.10.1, as applicable, in addition to requirements specified elsewhere.
 - 3. Electric Water Heaters: UL listed and labeled to UL 174.

4. Pressure Vessels for Heat Exchangers: ASME labeled to ASME BPVC-VIII-1.
 5. Water Tanks: ASME labeled to ASME BPVC-VIII-1.
 6. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.
- C. Identification: Provide pumps with manufacturer's name, model number, and rating/capacity identified by permanently attached label.
- D. Performance: Ensure pumps operate at specified system fluid temperatures without vapor binding and cavitation, are non-overloading in parallel or individual operation, operate within 25 percent of midpoint of published maximum efficiency curve.

1.06 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Provide five year manufacturer warranty for domestic water heaters.

PART 2 PRODUCTS

2.01 WATER HEATERS

- A. Manufacturers:
1. O. Smith Water Products Co: www.hotwater.com/#sle.
 2. PVI: www.pvi.com/#sle.
 3. Lochinvar: www.lochinvar.com/#sle.
 4. Bradford White: www.bradfordwhite.com.
 5. Substitutions: See Section 01 6000 - Product Requirements.
- B. Performance:
1. The water heater shall comply with the energy efficiency requirements of the latest edition of the ASHRAE 90.1 standard.
 2. The water heater's efficiency shall be verified through third party testing by AHRI and listed in the AHRI Certification Directory.
 3. Minimum hot water storage temperature shall be 140 degrees F, unless otherwise noted on Schedules.
- C. Commercial Electric:
1. Type: Factory-assembled and wired, electric, vertical storage.
 2. Performance: Refer to Schedules.
 3. Tank: Glass lined welded steel; 4 inch diameter inspection port, thermally insulated with minimum 2 inches glass fiber encased in corrosion-resistant steel jacket; baked-on enamel finish.
 4. Controls: Automatic immersion water thermostat; externally adjustable temperature range from 60 to 180 degrees F, flanged or screw-in nichrome elements, high temperature limit thermostat.
 5. Accessories:
 - a. Water Connections: Brass.
 - b. Dip Tube: Brass.
 - c. Drain valve.
 - d. Anode: Magnesium.
 - e. Temperature and Pressure Relief Valve: ASME labeled.
 6. Heating Elements: Flange-mounted immersion elements; individual elements sheathed with Incoloy corrosion-resistant metal alloy, rated less than 75 W/sq in.

2.02 DIAPHRAGM-TYPE COMPRESSION TANKS

- A. Manufacturers:
1. Amtrol Inc: www.amtrol.com/#sle.
 2. Bell & Gossett, a xylem brand: www.bellgossett.com/#sle.

3. Taco, Inc: www.taco-hvac.com/#sle.
 4. Lochinvar: www.lochinvar.com.
 5. Substitutions: See Section 01 6000 - Product Requirements.
- B. Construction: Welded steel, tested and stamped in accordance with ASME BPVC-VIII-1; supplied with National Board Form U-1, rated for working pressure of 150 psi and 240 degrees F max working temperature, with heavy duty butyl fixed diaphragm sealed into tank, and steel legs or saddles.
- C. Accessories: Pressure gauge and air-charging fitting, tank drain; precharge to 12 psig.

2.03 ELECTRICAL WORK

- A. Provide electrical motor driven equipment specified complete with motors, motor starters, controls, and wiring.
- B. Electrical characteristics to be as specified or indicated.
- C. Supply manual or automatic control and protective or signal devices required for the operation specified, and any control wiring required for controls and devices not shown.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install plumbing equipment in accordance with manufacturer's instructions, as required by code, and complying with conditions of certification, if any.
- B. Coordinate with plumbing piping and related gas venting and electrical work to achieve operating system.
- C. Provide for the service of a competent factory-trained supervising agent from the equipment manufacturer to inspect the completed installation, start the system and acquaint the operators with the proper operation and maintenance of the equipment.
- D. Notify engineer upon start-up and commissioning of pumps to ensure proper setpoints are used.
- E. Domestic Water Storage Tanks:
 1. Provide steel pipe support, independent of building structural framing members.
 2. Clean and flush prior to delivery to site. Seal until pipe connections are made.
- F. Floor Mounted Equipment:
 1. Install the system level and in accordance with manufacturer's published recommendations.
 2. Locate equipment with allowance for manufacturer's recommended clearances around unit.
 3. Set entire unit on 4" high reinforced concrete equipment pad.
 4. Pipe discharge from all relief valves, drains and individual pump thermal purge protection solenoid valves, indirectly to floor drain having adequate capacity to accept discharge.

**SECTION 224000
PLUMBING FIXTURES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Water closets.
- B. Urinals.
- C. Lavatories.
- D. Sinks.
- E. Service sinks.
- F. Electric water coolers.
- G. Bathtubs.
- H. Showers.
- I. Eye and face wash fountains.
- J. Emergency showers.

1.02 RELATED REQUIREMENTS

- A. Section 01 1000 - Summary: Owner-furnished fixtures.
- B. Section 22 1005 - Plumbing Piping.
- C. Section 22 1006 - Plumbing Piping Specialties.

1.03 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design 2010.
- B. IAPMO Z124 - Plastic Plumbing Fixtures 2017.
- C. ANSI Z358.1 - American National Standard for Emergency Eyewash and Shower Equipment 2014.
- D. ASHRAE Std 18 - Methods of Testing for Rating Drinking-Water Coolers with Self-Contained Mechanical Refrigeration. 2013.
- E. ASME A112.6.1M - Supports for Off-the-Floor Plumbing Fixtures for Public Use 1997 (Reaffirmed 2017).
- F. ASME A112.18.1 - Plumbing Supply Fittings 2018, with Errata.
- G. ASME A112.19.1 - Enamelled Cast Iron and Enamelled Steel Plumbing Fixtures 2018.
- H. ASME A112.19.2 - Ceramic Plumbing Fixtures 2018.
- I. ASME A112.19.3 - Stainless Steel Plumbing Fixtures 2017.
- J. ASME A112.19.5 - Flush Valves and Spuds for Water Closets, Urinals, and Tanks 2017.
- K. ASSE 1070 - Performance Requirements for Water Temperature Limiting Devices 2015.
- L. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2021.
- M. IAPMO Z124 - Plastic Plumbing Fixtures 2017.
- N. ISFA 2-01 - Classification and Standards for Solid Surfacing Material 2013.
- O. NEMA LD 3 - High-Pressure Decorative Laminates 2005.
- P. NSF 61 - Drinking Water System Components - Health Effects 2020.
- Q. NSF 372 - Drinking Water System Components - Lead Content 2020.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide catalog illustrations of fixtures, sizes, rough-in dimensions, utility sizes, trim, and finishes.
- C. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.
- D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.
 - 2. Extra Faucet Washers: Two sets of each type and size.
 - 3. Extra Toilet Seats: One of each type and size.
 - 4. Flush Valve Service Kits: One for each type and size.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Accept fixtures on site in factory packaging. Inspect for damage.
- B. Protect installed fixtures from damage by securing areas and by leaving factory packaging in place to protect fixtures and prevent use.

1.06 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Provide five year manufacturer warranty for electric water cooler.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Potable Water Systems: Provide plumbing fittings and faucets that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.

2.02 REGULATORY REQUIREMENTS

- A. Comply with applicable codes for installation of plumbing systems.
- B. Perform work in accordance with local health department regulations.

2.03 FLUSH VALVE WATER CLOSETS

- A. Water Closets: Vitreous china, ASME A112.19.2, wall hung or floor mounted as indicated on Schedules, siphon jet flush action, china bolt caps.
 - 1. Flush Valve: Exposed (top spud).
 - 2. Flush Operation: Refer to Schedules.
 - 3. Manufacturers:
 - a. American Standard, Inc: www.americanstandard-us.com/#sle.
 - b. Kohler Company: www.kohler.com/#sle.
 - c. Zurn Industries, Inc: www.zurn.com/#sle.
 - d. Sloan: www.sloan.com.
 - e. Substitutions: See Section 01 6000 - Product Requirements.
- B. Flush Valves: ASME A112.18.1, diaphragm type , complete with dual filtered by-pass, vacuum breaker stops and accessories.
 - 1. Exposed Type: Chrome plated, escutcheon, integral screwdriver stop.
 - 2. Manufacturers:
 - a. American Standard, Inc: www.americanstandard-us.com/#sle.
 - b. Sloan Valve Company: www.sloanvalve.com/#sle.
 - c. Zurn Industries, Inc: www.zurn.com/#sle.
 - d. Kohler Company[<>]: www.kohler.com/#sle.
 - e. Substitutions: See Section 01 6000 - Product Requirements.

- C. Seats:
1. Manufacturers:
 - a. Bemis Manufacturing Company: www.bemismfg.com/#sle.
 - b. Church Seat Company: www.churchseats.com/#sle.
 - c. Centoco: www.centoco.com
 - d. Manufacturer of Closet Bowl.
 - e. Substitutions: See Section 01 6000 - Product Requirements.
 2. Solid white plastic, open front, extended back, self-sustaining hinge, brass bolts, without cover.
- D. Water Closet Carriers For Wall Hung Closets:
1. Manufacturers:
 - a. Jay R. Smith MFG. Co: www.jrsmith.com/#sle.
 - b. JOSAM Company: www.josam.com/#sle.
 - c. Zurn Industries, Inc: www.zurn.com/#sle.
 - d. Substitutions: See Section 01 6000 - Product Requirements.
 2. ASME A112.6.1M; adjustable cast iron frame, integral drain hub and vent, adjustable spud, lugs for floor and wall attachment, threaded fixture studs with nuts and washers.

2.04 TANK TYPE WATER CLOSETS

- A. Tank Type Water Closet Manufacturers:
1. American Standard, Inc: www.americanstandard-us.com/#sle.
 2. Kohler Company: www.kohler.com/#sle.
 3. Zurn Industries, Inc: www.zurn.com/#sle.
 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Bowl: ASME A112.19.2; wall or floor mounted as indicated in Schedules, siphon jet, vitreous china, close-coupled closet combination with elongated rim, insulated vitreous china closet tank with fittings and lever flushing valve, bolt caps.
- C. Seat Manufacturers:
1. Bemis Manufacturing Company: www.bemismfg.com/#sle.
 2. Church Seat Company: www.churchseats.com/#sle.
 3. Centoco: www.centoco.com
 4. Manufacturer of Closet Bowl.
 5. Substitutions: See Section 01 6000 - Product Requirements.
- D. Seat: Solid white plastic, open front, brass bolts, without cover, complete with self-sustaining hinge.

2.05 WALL HUNG URINALS

- A. Wall Hung Urinal Manufacturers:
1. American Standard, Inc: www.americanstandard-us.com/#sle.
 2. Kohler Company: www.kohler.com/#sle.
 3. Zurn Industries, Inc: www.zurn.com/#sle.
 4. Sloan: www.sloan.com.
 5. Substitutions: See Section 01 6000 - Product Requirements.
- B. Urinals: Vitreous china, ASME A112.19.2, wall hung with side shields and concealed carrier.
1. Flush Valve: Exposed (top spud).
 2. Flush Operation: Refer to Schedules.
 3. Trap: Integral.
- C. Flush Valves: ASME A112.18.1, diaphragm type , complete with dual filtered by-pass, vacuum breaker stops and accessories.

1. Exposed Type: Chrome plated, escutcheon, integral screwdriver stop.
2. Manufacturers:
 - a. American Standard, Inc: www.americanstandard-us.com/#sle.
 - b. Sloan Valve Company: www.sloanvalve.com/#sle.
 - c. Zurn Industries, Inc: www.zurn.com/#sle.
 - d. Kohler Company[<>]: www.kohler.com/#sle.
 - e. Substitutions: See Section 01 6000 - Product Requirements.
- D. Carriers:
 1. Manufacturers:
 - a. Jay R. Smith MFG. Co: www.jrsmith.com/#sle.
 - b. JOSAM Company: www.josam.com/#sle.
 - c. Zurn Industries, Inc: www.zurn.com/#sle.
 - d. Substitutions: See Section 01 6000 - Product Requirements.
 2. ASME A112.6.1M; cast iron and steel frame with tubular legs, lugs for floor and wall attachment, threaded fixture studs for fixture hanger, bearing studs.

2.06 LAVATORIES

- A. Lavatory Manufacturers:
 1. American Standard, Inc: www.americanstandard-us.com/#sle.
 2. Kohler Company: www.kohler.com/#sle.
 3. Zurn Industries, Inc: www.zurn.com/#sle.
 4. Sloan: www.sloan.com.
 5. Substitutions: See Section 01 6000 - Product Requirements.
- B. Vitreous China Basin: ASME A112.19.2; vitreous china wall hung or counter-top mounted as indicated on Schedules, with overflow.
- C. Supply Faucet Manufacturers:
 1. American Standard, Inc: www.americanstandard-us.com/#sle.
 2. Kohler Company: www.kohler.com/#sle.
 3. Zurn Industries, Inc: www.zurn.com/#sle.
 4. Symmons: www.symmons.com.
 5. Delta Faucet: www.deltafaucet.com
 6. Sloan: www.sloan.com
 7. Substitutions: See Section 01 6000 - Product Requirements.
- D. Supply Faucet: ASME A112.18.1; chrome plated supply fitting with water economy aerator with maximum flow of 0.5 gallon per minute (low-flow), ADA compliant handles.
- E. Accessories:
 1. Lavatory P-trap shall be chrome plated cast brass adjustable ground joint swivel with cleanout, with 17- gauge seamless brass adjustable wall bend provided with deep bell flange. P-Trap to have 2" water seal and rough-in complete, adapter extensions are not allowed. P-Trap shall be certified by CSA or other recognized third-party testing authority and marked with manufacturer's name. No private label wholesale products will be allowed.
 2. Offset waste with perforated open strainer.
 3. Screwdriver Loose key stops.
 4. Lavatory supply kits shall include chrome plated all brass stops with brass stems, no plastic stems. Kits shall have 12" chrome plated copper risers and shallow brass flange. Inlet shall be 1/2" compression and outlet shall be 3/8" compression. Supply kit shall be certified by recognized independent third-party testing authority, will be marked with the manufacturer's name and comply with the SDWA (Safe Drinking Water Act) "No Lead" restrictions of ANSI NSF 61, Sec. 9. No private label wholesale products will be

- allowed.
5. All exposed lavatory and sink trim on wheelchair accessible fixtures shall be covered with a seamless antimicrobial vinyl insulating outer shell. Material shall be flame retardant and fungal and bacterial resistant. Insulating kits shall include covers for, drain tailpiece, all P-Trap components, and hot/cold water supplies.
 6. Install with point of use thermostatic mixing valve. Refer to Section 22 1006.
 7. Carrier for Wall Mounted Lavatories:
 - a. Manufacturers:
 - 1) Jay R. Smith MFG. Co: www.jrsmith.com/#sle.
 - 2) JOSAM Company: www.josam.com/#sle.
 - 3) Zurn Industries, Inc: www.zurn.com/#sle.
 - 4) Substitutions: See Section 01 6000 - Product Requirements.
 - b. ASME A112.6.1M; cast iron and steel frame with tubular legs, lugs for floor and wall attachment, threaded studs for fixture hanger, bearing plate and studs.

2.07 SINKS

- A. Sink Manufacturers:
 1. American Standard, Inc: www.americanstandard-us.com/#sle.
 2. Elkay: www.elkay.com.
 3. Just Manufacturing: www.justmfg.com
 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. General: ASME A112.19.3, stainless steel, self rimming and undercoated.
- C. Bowl Quantity and Size: Refer to Schedules.
- D. Faucet:
 1. Gooseneck faucet with ADA wristblade handles
 2. Flowrate: Refer to Schedules.
 3. Manufacturers:
 - a. Kohler Company: www.kohler.com/#sle.
 - b. Chicago Faucet: www.chicagofaucets.com
 - c. Delta Faucet: www.deltafaucet.com
 - d. Substitutions: See Section 01 6000-Product Requirements.
- E. Accessories:
 1. Garbage Disposal:
 - a. Provide garbage disposal for sink. For multiple bowl sinks, coordinate which drain to install disposal in with Architect.
 - b. Disposal shall have stainless steel grind chamber, continuous feed, automatic reversing action with 120V, single phase motor. Refer to Schedules for motor HP.
 - c. Manufacturers:
 - 1) In-Sink-Erator
 - 2) Substitutions: See Section 01 6000-Product Requirements.
 2. Drain:
 - a. Removable basket strainer.
 3. Sink P-trap shall be chrome plated cast brass adjustable ground joint swivel with cleanout, with 17- gauge seamless brass adjustable wall bend provided with deep bell flange. P-Trap to have 2" water seal and rough-in complete, adapter extensions are not allowed. P-Trap shall be certified by CSA or other recognized third-party testing authority and marked with manufacturer's name. No private label wholesale products will be allowed.
 4. Screwdriver, Loose key stops.
 5. Lavatory supply kits shall include chrome plated all brass stops with brass stems, no plastic stems. Kits shall have 12" chrome plated copper risers and shallow brass

flange. Inlet shall be 1/2" compression and outlet shall be 3/8" compression. Supply kit shall be certified by recognized independent third-party testing authority, will be marked with the manufacturer's name and comply with the SDWA (Safe Drinking Water Act) "No Lead" restrictions of ANSI NSF 61, Sec. 9. No private label wholesale products will be allowed.

6. All exposed lavatory and sink trim on wheelchair accessible fixtures shall be covered with a seamless antimicrobial vinyl insulating outer shell. Material shall be flame retardant and fungal and bacterial resistant. Insulating kits shall include covers for, drain tailpiece, all P-Trap components, and hot/cold water supplies.
7. Install with point of use thermostatic mixing valve, where noted in Schedules or where fixture must be ADA compliant. Refer to Section 22 1006.

2.08 BATHTUBS AND SHOWERS

- A. Bathtub/Shower Manufacturers:
 1. American Standard, Inc: www.americanstandard-us.com/#sle.
 2. Kohler Company: www.kohler.com/#sle.
 3. Sterling: www.sterlingplumbing.com
 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Bathtub/Shower: Refer to Schedules.
- C. Bath and Shower Trim: ASME A112.18.1; ASSE 1016; concealed shower and over rim supply with diverter spout, pressure balanced mixing valve, bent shower arm with adjustable spray ball joint showerhead with maximum flow rate as listed in Schedules and escutcheon, lever operated pop-up waste and overflow.

2.09 SHOWER RECEPTORS

- A. Solid Surfacing Shower Receptors: Solid plastic resin casting, self-supporting, for installation over conventional subfloor; complying with IAPMO Z124.
 1. Material: Complying with ISFA 2-01 and NEMA LD 3; acrylic or polyester resin, renewable material filler, and pigments; homogenous, non-porous and capable of being worked and repaired using standard woodworking tools; no surface coating; color and pattern consistent throughout thickness.
 2. Surface Burning Characteristics: Flame spread index of 25 or less, and smoke developed index of 450 or less, Class A, when tested in accordance with ASTM E84.
 3. Where indicated in Schedules that fixture shall be ADA: Shower base to be recessed flush with finished floor and comply with ADA Standards and approved by the authorities having jurisdictions (AHJ).
 4. Color and Pattern: As indicated.
 5. Manufacturers:
 - a. Acorn Engineering Company: www.acorneng.com/#sle.
 - b. American Standard, Inc: www.americanstandard-us.com/#sle.
 - c. Best Bath Systems: www.bestbath.com/#sle.
 - d. Sterling: www.sterlingplumbing.com
 - e. Substitutions: See Section 01 6000 - Product Requirements.
- B. Drain Trim: Removable chrome plated strainer and tail piece.

2.10 SHOWERS

- A. Shower Valve:
 1. Comply with ASME A112.18.1 and ASSE 1016.
 2. Provide in wall diverter valve body with integral thermostatic mixing valve to supply shower head.
 3. Shower Valve Manufacturers:
 - a. American Standard, Inc: www.americanstandard-us.com/#sle.

- b. DXV by American Standard, Inc: www.dvx.com/#sle.
- c. Grohe America, Inc: www.grohe.com/us/#sle.
- d. Symmons
- e. Substitutions: See Section 01 6000 - Product Requirements.

B. Shower Head:

1. ASME A112.18.1; chrome plated head with integral wall bracket, built-in flow control.
2. Shower Head Manufacturers:
 - a. American Standard, Inc: www.americanstandard-us.com/#sle.
 - b. DXV by American Standard, Inc: www.dvx.com/#sle.
 - c. Grohe America, Inc: www.grohe.com/us/#sle.
 - d. Symmons
 - e. Substitutions: See Section 01 6000 - Product Requirements.

2.11 BI-LEVEL, ELECTRIC WATER COOLERS

A. Bi-level, Electric Water Cooler Manufacturers:

1. Elkay Manufacturing Company: www.elkay.com/#sle.
2. Haws Corporation: www.hawsc.com/#sle.
3. Murdock Manufacturing, Inc: www.murdockmfg.com/#sle.
4. Oasis International: www.oasiscoolers.com/#sle.
5. Substitutions: See Section 01 6000 - Product Requirements.

B. Water Cooler: Bi-level, electric, mechanically refrigerated; mounting as specified on Schedules , ADA compliant; elevated anti-squirt bubbler with stream guard, automatic stream regulator, push button, mounting bracket; integral air cooled condenser.

1. Capacity: 8 gallons per hour of 50 degrees F water with inlet at 80 degrees F and room temperature of 90 degrees F, when tested in accordance with ASHRAE Std 18.
2. Electrical: 115 V, 60 Hertz compressor, 6 foot cord and plug for connection to electric wiring system including grounding connector.

C. Bottle Filler: Materials to match fountain.

2.12 SERVICE SINKS

A. Service Sink Manufacturers:

1. American Standard, Inc: www.americanstandard-us.com/#sle.
2. Elkay Manufacturing Company: www.elkay.com/#sle.
3. Just Manufacturing Company: www.justmfg.com/#sle.
4. Fiat: www.fiatproducts.com.
5. Substitutions: See Section 01 6000 - Product Requirements.

B. Bowl: ASME A112.19.1; porcelain enamelled (inside only) cast iron roll-rim sink or white molded stone, with 12 inch high back, concealed hanger, chrome plated strainer, stainless steel rim or vinyl bumper guards.

C. Trim: ASME A112.18.1 exposed wall type supply, spout wall brace, vacuum breaker, hose end spout, strainers, eccentric adjustable inlets, integral screwdriver stops with covering caps and adjustable threaded wall flanges.

D. Accessories:

1. 5 feet of 1/2 inch diameter plain end reinforced plastic hose.
2. Hose clamp hanger.
3. Mop hanger.

2.13 EMERGENCY EYE AND FACE WASH

A. Emergency Wash Manufacturers:

1. Haws Corporation: www.hawsc.com/#sle.

2. Therm-Omega-Tech, Inc: www.thermomegatech.com/#sle.
 3. Bradley Safety: www.bradleysafety.com.
 4. Acorn: www.acorneng.com
 5. Substitutions: See Section 01 6000 - Product Requirements.
- B. Emergency Wash: ANSI Z358.1; mounting as specified in Schedules , self-cleaning, non-clogging eye and face wash with quick opening, full-flow valves, stainless steel or ABS eye and face wash receptor, twin eye wash heads and face spray ring, dust cover , control valve and fittings.
- C. Thermostatic Mixing Valve: Thermostatic mixing valve, ASSE 1071 listed, with combination stop, strainer, and check valves, and flexible stainless steel connectors.

2.14 EMERGENCY SHOWERS

- A. Emergency Shower Manufacturers:
1. Haws Corporation: www.hawesco.com/#sle.
 2. Therm-Omega-Tech, Inc: www.thermomegatech.com/#sle.
 3. Bradley Safety: www.bradleysafety.com.
 4. Acorn: www.acorneng.com
 5. Substitutions: See Section 01 6000 - Product Requirements.
- B. Emergency Shower: ANSI Z358.1; mounting as specified in Schedules , self-cleaning, non-clogging 8 inch diameter stainless steel or plastic deluge shower head with elbow, one inch full flow valve with pull chain and 8 inch diameter ring, one inch interconnecting fittings.
- C. Thermostatic Mixing Valve: Thermostatic mixing valve, ASSE 1071 listed, with combination stop, strainer, and check valves, and flexible stainless steel connectors.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that walls and floor finishes are prepared and ready for installation of fixtures.
- B. Verify that electric power is available and of the correct characteristics.
- C. Confirm that millwork is constructed with adequate provision for the installation of counter top lavatories and sinks.
- D. Examine floors and substrates and conditions under which fixture work is to be accomplished. Correct any incorrect locations of piping and other unsatisfactory conditions for installation of plumbing fixtures. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to installer.
- E. Inspect fixtures and accessories that are to be removed and relocated. Damaged or blemished items shall be brought to Architect's/Engineer's attention before reinstalling.

3.02 PREPARATION

- A. Rough-in fixture piping connections in accordance with minimum sizes indicated in fixture rough-in schedule for particular fixtures.

3.03 INSTALLATION

- A. Install each fixture with trap, easily removable for servicing and cleaning.
- B. Install components level and plumb.
- C. Piping exposed to view shall be chrome plated.
- D. Solidly attach water closets to floor with lag screws. Lead flashing is not intended hold fixture in place.

3.04 INTERFACE WITH WORK OF OTHER SECTIONS

- A. Review millwork shop drawings. Confirm location and size of fixtures and openings before rough-in and installation.
- B. Adjust or replace washers to prevent leaks at faucets and stops.

3.05 ADJUSTING

- A. Adjust stops or valves for intended water flow rate to fixtures without splashing, noise, or overflow.

3.06 CLEANING

- A. Clean plumbing fixtures and equipment.

3.07 PROTECTION

- A. Protect installed products from damage due to subsequent construction operations.
- B. Do not permit use of fixtures by construction personnel.
- C. Repair or replace damaged products before Date of Substantial Completion.

3.08 FEILD QUALITY CONTROL

- A. Upon completion of installation of plumbing fixtures and after units are water pressurized, test fixtures to demonstrate capability and compliance with requirements. When possible, correct malfunctioning units at site, then retest to demonstrate compliance; otherwise, remove and replace with new units and proceed with retesting.
- B. Inspect each installed unit for damage to finish. If feasible, restore and match finish to original at site; otherwise, remove fixture and replace with new unit. Feasibility and match to be judged by Architect/Engineer. Remove cracked or dented units and replace with new units.

**SECTION 230005
BASIC HVAC REQUIREMENTS**

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. This section applies to all sections of Division 23.
- B. Drawings and general provisions of the contract, including Division 00 and Division 01 specification sections, apply to work of this section.
- C. Provide all items, articles, materials, operations or methods listed, mentioned or scheduled on drawings and/or herein, including all labor, materials, equipment and incidentals necessary and required for their completion.
- D. The items in this section are supplementary to the requirements set forth in other portions of the specifications as indicated under item "A" above.

1.02 APPLICATION

- A. This section applies to all mechanical work. The contractors involved shall check all sections of the specifications in addition to the particular section covering their specific trade. Each distinct section of the specifications aimed for one trade may have detailed information with regards to other trades, therefore, it is imperative that all sections be reviewed to get a complete picture of all other trades' functions and work required.
- B. The mechanical contractor is responsible for the installation and operation of the hvac systems and temperature control systems.
- C. The mechanical contractor is responsible for receiving, unloading and placement of all of the owner provided equipment.

1.03 INSPECTION OF SITE

- A. Visit the site, examine and verify the conditions under which the work must be conducted before submitting proposal.
- B. The submitting of a proposal implies that the contractor has visited the site and understands the conditions under which the work must be conducted.

1.04 ALTERNATES AND SUBSTITUTIONS

- A. Refer to Division 01 - General Requirements for procedures.

1.05 DEVIATION FROM BASIS OF DESIGN MANUFACTURER

- A. Products identified within the schedules and details are used as the basis of design for laying out and coordinating with other trades such as structural, architectural, and electrical. Should the Division 23 Contractors submit equipment by a Manufacturer other than that indicated as the Basis of Design in the Drawings, Contractor shall then be responsible for evaluating the impacts of the proposed Manufacturer's equipment, even if the Manufacturer is listed in the specifications as an approved equal. This includes the proposed Manufacturer's electrical, architectural and structural requirements and their subsequent impacts on the current design (roof openings, curbs, structural support, etc.) and coordination of any differing dimensions and clearances with all other trades.

1.06 MATERIALS

- A. Mechanical equipment is to be furnished with motors, electrical controls and protective devices, and integral operating devices which are normally included by the manufacturer or required by the Contract Documents.
- B. The Mechanical Trades shall provide all control wiring, 120 volts and less, for the equipment and devices furnished under Division 22, and 23 of these specifications, including all wiring devices, conduit, etc.

- C. Power wiring 120 volts and greater shall be by the Electrical Trades.

1.07 DRAWINGS

- A. The drawings are diagrammatic and show the general location and arrangement of all equipment, piping and related items. They shall be followed as closely as elements of the construction will permit.
- B. Examine the drawings of other trades and verify the conditions governing the work on the job site. The mechanical and electrical contractor shall check all documents including architectural, structural, plumbing, HVAC and electrical to avert possible installation conflicts. Arrange work accordingly, providing such fittings, traps, valves and accessories as may be required to meet such conditions.
- C. Deviations from the drawings, with the exception of minor changes in routing and other such incidental changes that do not affect the functioning or serviceability of the systems, shall not be made without the written approval of the Architect/Engineer.
- D. The architectural and structural drawings take precedence in all matters pertaining to the building structure, mechanical drawings in all matters pertaining to mechanical trades and electrical drawings in all matters pertaining to electrical trades. Where there are conflicts or differences between the drawings for the various trades, report such conflicts or differences to the Architect/Engineer for resolution.
- E. Do not scale drawings for measurements.
- F. Field verifications of actual existing conditions are required by the contractor since actual locations, distances, and levels will be governed by actual field conditions. All measurements shall be verified at the site.
- G. If during field verification, the contractor identifies that there may require substantial changes from the original plans, the contractor shall notify the architect for agreement on necessary adjustment before the installation is started
- H. Discrepancies shown between plans, or between plans and actual field conditions, or between plans and specifications shall promptly be brought to the attention of the Architect/Engineer for a decision.
- I. Drawings and specifications are intended to cover the completed installation of systems to function as described. The omission of the expressed reference to any item of labor and material necessary to comply with practice codes, ordinances, etc., shall not relieve the contractor from providing such additional labor and material at no cost to Owner.

1.08 CODES, PERMITS AND FEES

- A. Unless otherwise indicated, all required permits, licenses, inspections, approvals and fees for mechanical work shall be secured and paid for by the contractor. All work shall conform to all applicable codes, rules and regulations. Applicable publications listed in all sections of Division 23 shall be the latest issue, unless otherwise noted.
- B. Rules of local utility companies and municipalities shall be complied with. Check with the utility company and/or municipality supplying service to the installation and determine all devices including, but not limited to: meters, regulators, valves which will be required and include the cost of all such items in the proposal.
- C. All work shall be executed in accordance with the rules and regulations set forth in local and state codes. Prepare any detailed drawings or diagrams which may be required by the governing authorities. Where the drawings and/or specifications indicate materials or construction in excess of code requirements, the drawings and/or specifications shall govern.

1.09 MAINTENANCE

- A. Provide 40 hours of instruction to the owner's designated personnel in the maintenance and operation of equipment and systems.
- B. Provide complete maintenance and operating instructional manuals covering all mechanical equipment herein specified, together with parts lists. Maintenance and operating instructional manuals shall be job specific to this project. Generic manuals are not acceptable. Four (4) copies of all literature shall be furnished for owner and shall be bound in book or ring binder form. Maintenance and operating instructional manuals shall be provided when construction is approximately 75% complete.

1.10 WARRANTY AND GUARANTEE

- A. Contractor shall guarantee all work installed by themselves or their subcontractors to be free from defect in material and workmanship for a period of one year from date of final acceptance of the work, unless a longer period is stipulated under specific headings. Contractor shall repair or replace at no additional cost to the owner, any material or equipment developing defects and shall also make good any damage caused by such defects or the correction of defects. Repairs or replacements shall bear additional guarantee, as originally called for, dated from the final acceptance of the repair or replacement. This requirement shall be binding even though it will exceed product guarantees normally furnished by some manufacturers. Contractor shall submit his own and each equipment manufacturers written certificates, warranting that each item of equipment furnished complies with all requirements of the drawings and specifications. Note that guarantee shall run from date of final acceptance of the work, not from date of installation of a device or piece of equipment.

1.11 SUBMITTALS

- A. Refer to Division 01 - General Requirements for procedures.
- B. Contractor shall provide submittals where items are referred to by symbolic designation on the drawings. All submittals shall bear the same designation (hvac equipment, piping equipment, etc.). Refer to other sections of the mechanical specifications for additional requirements.
- C. Engineer WILL NOT REVIEW:
 - 1. Submittals not specified.
 - 2. Submittals not reviewed by Contractor, including Contractor stamp with signature comments.
 - 3. Submittals made after work is delivered to site and/or installed.
 - 4. Submittal resubmissions unless resubmission is required by Architect/Engineer.
- D. Types of submittals include the following:
 - 1. Shop Drawings
 - 2. Product Data Sheets
 - 3. Samples
 - 4. Manufacturers Instructions
 - 5. Maintenance Data
 - 6. Warranty
- E. Installation of any item that requires submittal approval by the engineer shall be installed at the contractors risk. The contractor, at his cost, shall remove all work installed prior to approval of the submittal.
- F. The engineer will not be responsible for errors in quantities, or dimensions required to fit the job condition, details of fabrication to insure proper assembly at the job, or for errors resulting from mistakes in submittals.

1.12 RECORD DRAWINGS

- A. Refer to Division 01 - General Requirements for procedures.

- B. Contractor shall provide the following record drawings as part of the Project closeout document process:
 - 1. Contract Documents, specifications and submittals, indicating "As-Built" conditions and actual products selected for use.
 - 2. Product and Maintenance manuals for all equipment listed within this specification manual and in Contract Documents. Provide with parts lists as applicable.
- C. Record drawings shall be maintained by the contractor up to date as the project progresses.
- D. Recording all deviations from the contract documents, indicate exact locations of all buried services both inside and outside of the building; include concealed piping and equipment in the entire contract. Final record drawings shall reflect the as-built conditions.

1.13 QUALITY ASSURANCE

- A. Other referenced standards:
 - 1. Comply with referenced standards, guidelines, data sheets from various associations, including NFPA, ANSI, ASTM, ASME, ASHRAE

PART 2 PRODUCTS

2.01 SLEEVES AND ESCUTCHEONS

- A. Provide sleeves wherever pipes pass through exterior wall, and floors. Sleeves shall be schedule 40 steel pipe cut to length. Sleeves shall terminate flush with walls, partitions and ceilings in finished areas. All sleeves through floor shall extend 2" above floor. Provide cast brass nickel-plated escutcheons with positive catches on each visible sleeve penetration. Sleeves are to be sealed at each installation with a 3M approved sealant. The space between the inside of the sleeve and the outside of the pipe or conduit within the sleeve shall be sealed at each installation with a 3M approved sealant.

2.02 DIELECTRIC UNIONS

- A. Dielectric unions shall be used to connect dissimilar metals (such as steel and copper) to prevent electrolytic action.

2.03 FILTERS

- A. Provide and maintain filters in air handling systems throughout the construction period and prior to final acceptance of the building. Do not run air handling equipment without all prefilters and final filters as specified. Immediately prior to final building acceptance by the owner, contractor shall replace all disposable type air filters with new.

2.04 BUILDING ATTACHMENTS FOR MECHANICAL WORK SUPPORTS

- A. General Requirements:
 - 1. Provide building attachments required for supporting mechanical work, suitably selected and installed for the loads applied with a minimum additional safety factor of 3.
 - 2. Where specified attachments are not suitable for conditions, submit to Engineer for approval, proposal for alternate building attachments.
 - 3. If specially designed building attachments are required, retain the services of a licensed structural engineer to design such building attachments.
 - 4. Approved Manufacturers: Grinnell, or equivalent products by Michigan Hanger and B-Line.
 - 5. Provide supplemental trapeze supports where necessary. Design trapeze to support all trades. Coordinate loads, and supports with all trades. Size trapeze for maximum deflection of 1/64 of the span.
- B. Attachments to Structural Steel:
 - 1. Support mechanical work from building structural steel where possible and approved. No welding or bolting to structural steel is permitted unless authorized by Architect. C-clamps are not permitted.

- a. Center beam clamp - for loads over 120 lb.: Malleable center hung Grinnell Fig. 228.
 - b. Side beam clamp with retaining clips - for loads up to 120 lb.
- C. Cast in Place Concrete Inserts:
1. Provide inserts selected for applied load of present load plus 100% for future, and coordinated with concrete work. Except as detailed on drawings, inserts shall be Unistrut or Grinnell. Plan, lay out and coordinate setting of inserts prior to concrete pour. Use Grinnell Fig. 285 lightweight concrete insert for loads up to 400# or Grinnell Fig. 281 Wedge Type concrete insert for loads up to 1200#
- D. Drilled Insert Anchors:
1. Where mechanical work cannot be supported from structural steel, or cast in place concrete inserts, provide drilled concrete insert anchors. Submit for approval, project specific installation drawings for all loads over 100 lbs. Install inserts in web of beam if possible and approved. Insert depth shall not exceed two thirds the thickness of the concrete. Where existing concrete appears to be deteriorating, or where applied load at insert exceeds 1000 lbs., conduct test of concrete to determine derated capacity of insert. Anchors may be adhesive or expansion type up to 1000 lbs., and shall be adhesive type for loads over 1000 lbs.
 2. Manufacturers: Hilti

PART 3 EXECUTION

3.01 GENERAL

- A. Existing piping and ductwork: when encountered during the course of work, protect, brace and support existing piping and ductwork where required for proper execution of the work.
- B. Interruption of existing active piping and ductwork: when the course of work makes shut-down of services unavoidable, the mechanical contractor shall schedule the shut-down at such time as approved by the owners representative, which will cause least interference with established operating routine.
- C. Arrange work accordingly, providing such fittings as duct transitions traps, valves and accessories necessary to complete all construction in an orderly fashion.
- D. Install all equipment in strict accordance all directions and recommendations furnished by the manufacturer.

3.02 ACCESSIBILITY

- A. Do not locate valves, traps, controls, unions, dampers, etc. in any system at a location that will be inaccessible after construction is completed. Maintain accessibility for all components in mechanical, electrical, and plumbing systems.

3.03 ACCESS DOORS AND PANELS

- A. Refer to Division 08 - Openings; Provide access doors in locations as required by applicable codes and as indicated below. Coordinate locations with architectural trades.
- B. Furnish access panels to access valves, traps, control valves or devices, dampers, damper motors, etc. Access panels shall be sized as necessary for ample access, or as indicated on drawings, but no smaller than 12" x 12" where devices are within easy reach of operator, and at least 24"x24" when operator must pass through opening in order to reach the devices. Architectural Trades shall install access panels coordinated with Mechanical Trades.
- C. Access panels in fire rated walls or ceiling must be U.L. labeled for intended use. Unless otherwise indicated on plans, access doors shall be hinged flush type steel framed panel, 14 gauge minimum for frame, and with anchor straps. Only narrow border shall be exposed. Hinges shall be concealed type. Locking device shall be flush type and screw driver operated. Metal surfaces shall be prime coated with rust-inhibitive paint. Panels shall be compatible with architectural adjacent materials Manufacturer: Milcor, Bilco.

3.04 CUTTING AND PATCHING

- A. Refer to Division 01 - General Requirements and Division 02 - Existing Conditions.
- B. All cutting required shall be done by the contractor whose work is involved, without extra cost the owner. All patching and restoration including the furnishing and installation of access panels in ceiling, walls; etc. Within the building lines shall be done by the respective, responsible contractor. No cutting of structural steel, concrete, or wood shall be done without prior approval and explicit directions of the architect patched by the respective, responsible contractor.
- C. The contractor, under whose jurisdiction the work may fall, shall provide labor, material, and tools required to cut, repair, protect, cap, or relocate existing pipes, conduits, or utilities interfering with or uncovered during work, per regulations of the authorities having jurisdiction.

3.05 ROUGH-IN FOR CONNECTION TO EQUIPMENT

- A. It shall be the responsibility of each contractor to study the architectural, structural, electrical, and mechanical drawings, conferring with the various trades involved and checking with the supplier of equipment in order to properly rough-in for all equipment.

3.06 MATERIAL AND EQUIPMENT

- A. All material and equipment shall be new and of the best quality used for the purpose in good commercial practice, and shall be the standard product of reputable manufacturers. The material and equipment must meet approval of state and local codes in the area it is being used. Roof decks shall not be used to support piping, conduit, equipment, devices, etc.

3.07 SEAL PENETRATIONS

- A. Seal the space around pipes in sleeves and around duct openings through walls, floors and ceilings. Provide adequate clearance to allow for proper sealing.

3.08 SOUND CONTROL

- A. Penetrations shall be maintained airtight to prevent sound transfer.
- B. Piping, ductwork, etc. shall pass through sleeves. Pack sleeves tight with glass fiber or oakum and caulked on both sides with non-hardening acoustical sealant.

3.09 FIRESTOPPING

- A. Refer to Division 07 - Thermal and Moisture Protection for more information.
- B. Provide UL classified firestopping system for mechanical penetrations through rated walls and floors to maintain the fire rating.

3.10 DELIVERY, STORAGE AND HANDLING OF EQUIPMENT AND MATERIALS

- A. Refer to Division 01 - General Requirements; All equipment and materials shall be delivered, stored and secured per manufacturer's recommendations.
- B. On-site storage shall be coordinated with Construction Manager and be performed in a manner as to avoid damage, deterioration and loss.
- C. Contractor shall provide temporary protection for installed equipment prior to project completion.
- D. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- E. All equipment shall be inspected prior to installation to assure that equipment is free from defect and damage.
- F. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.
- G. Protect dampers, grilles, louvers from damage to operating linkages and blades.

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3.11 CLEANING

- A. Refer to Division 01 - General Requirements; all mechanical equipment and components shall be cleaned as frequently as necessary through the construction process and again prior to project completion.

3.12 CONTROL WIRING

- A. All control wiring for mechanical and electrical equipment, including motor starters, shall be 120 volt maximum and wired with one side of the coil grounded and the operating contacts in the north side of the circuit. All control wiring shall be installed in conduit.

**SECTION 230505
SELECTIVE DEMOLITION FOR HVAC**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Demolition and extension of existing mechanical work.

1.02 RELATED REQUIREMENTS

- A. Division 01 - General Requirements: Project administrative and procedural requirements.
- B. Division 02 - Existing Conditions: Demolition, cleaning and disposal requirements, cutting and patching requirements, repairs.

1.03 SUMMARY

- A. The work covered under this section consists of the furnishing of all necessary labor, supervision, materials, equipment, and services to completely execute the system of minor electrical demolition as described in this specification.
- B. The demolition documents plans and specification have been prepared from existing non-as built documents and cursory non-invasive field investigation.
- C. It is the contractors obligation to become familiar with the extent of demolition and the existing condition before submitting their bid.
- D. During demolition if the contractor discovers unforeseen significant non-code compliance conditions of the existing installation they shall notify the Architect and Engineer immediately in writing.
- E. The contractor shall become familiar with the drawings and scope of work of other trades as the work scope of those trades relates to mechanical equipment and connection requirements.
- F. During demolition the contractor shall record on site as-builts all hydronic system piping capped branches, capped supply air, return air and exhaust ducts for reuse in renovated project space.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Materials and equipment for patching and extending work: As specified in individual sections.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that piping and ductwork to be demolished serve only equipment and facilities within the demolition areas.
- B. Demolition drawings are based on casual field observation and existing record documents.
- C. Report discrepancies to Owner before disturbing existing installation.
- D. Beginning of demolition means installer accepts existing conditions.

3.02 PREPARATION

- A. Identify locations for capping piping and ductwork before any demolition work commences.
- B. Confirm isolation valve locations for hydronic piping. Repair leaking isolation valves or replace inoperable valves before commencing piping demolition.
- C. Cap and seal air-tight supply, return and exhaust air ductwork at shaft walls before commencing sheet metal demolition

3.03 DEMOLITION AND EXTENSION OF EXISTING MECHANICAL WORK

- A. Remove, relocate, and extend existing mechanical piping or sheet metal work to accommodate new construction.

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- B. Remove hydronic water piping back to isolation valve.
- C. Remove all supply, return and exhaust air ductwork back to main connection.
- D. Evacuate all properly dispose of all refrigerant in existing mechanical systems per EPA requirements.

3.04 CLEANING AND REPAIR

- A. Refer to Division 01 - General Requirements for procedures.
- B. Clean and repair existing materials and equipment that remain or that are to be reused.

**SECTION 230593
TESTING, ADJUSTING, AND BALANCING FOR HVAC**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Testing, adjustment, and balancing of air systems.
- B. Measurement of final operating condition of HVAC systems.

1.02 RELATED REQUIREMENTS

- A. Section 23 0005 - Basic HVAC Requirements.

1.03 REFERENCE STANDARDS

- A. AABC (NSTSB) - AABC National Standards for Total System Balance, 7th Edition 2016.
- B. ASHRAE Std 111 - Measurement, Testing, Adjusting, and Balancing of Building HVAC Systems 2008 (Reaffirmed 2017).
- C. NEBB (TAB) - Procedural Standards for Testing Adjusting and Balancing of Environmental Systems 2015, with Errata (2017).
- D. SMACNA (TAB) - HVAC Systems Testing, Adjusting and Balancing 2002.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Installer Qualifications: Submit name of adjusting and balancing agency and TAB supervisor for approval within 30 days after award of Contract.
- C. TAB Plan: Submit a written plan indicating the testing, adjusting, and balancing standard to be followed and the specific approach for each system and component.
 - 1. Submit six weeks prior to starting the testing, adjusting, and balancing work.
 - 2. Include at least the following in the plan:
 - a. List of all air flow, water flow, sound level, system capacity and efficiency measurements to be performed and a description of specific test procedures, parameters, formulas to be used.
 - b. Copy of field checkout sheets and logs to be used, listing each piece of equipment to be tested, adjusted and balanced with the data cells to be gathered for each.
 - c. Discussion of what notations and markings will be made on the duct and piping drawings during the process.
 - d. Final test report forms to be used.
 - e. Details of how TOTAL flow will be determined; for example:
 - 1) Air: Sum of terminal flows via control system calibrated readings or via hood readings of all terminals, supply (SA) and return air (RA) pitot traverse, SA or RA flow stations.
 - 2) Water: Pump curves, circuit setter, flow station, ultrasonic, etc.
 - f. Exhaust fan balancing and capacity verifications, including any required room pressure differentials.
 - g. Procedures for formal deficiency reports, including scope, frequency and distribution.
- D. Final Report: Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
 - 1. Revise TAB plan to reflect actual procedures and submit as part of final report.
 - 2. Submit draft copies of report for review prior to final acceptance of Project. Provide final copies for Owner and Engineer and for inclusion in operating and maintenance manuals.
 - 3. Include actual instrument list, with manufacturer name, serial number, and date of calibration.

4. Form of Test Reports: Where the TAB standard being followed recommends a report format use that; otherwise, follow ASHRAE Std 111.
 5. Units of Measure: Report data in both I-P (inch-pound) and SI (metric) units.
 6. Include the following on the title page of each report:
 - a. Name of Testing, Adjusting, and Balancing Agency.
 - b. Address of Testing, Adjusting, and Balancing Agency.
 - c. Telephone number of Testing, Adjusting, and Balancing Agency.
 - d. Project name.
 - e. Project location.
 - f. Report date.
- E. Project Record Documents: Record actual locations of flow measuring stations and balancing valves and rough setting.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS

- A. Perform total system balance in accordance with one of the following:
 1. AABC (NSTSB), AABC National Standards for Total System Balance.
 2. ASHRAE Std 111, Practices for Measurement, Testing, Adjusting and Balancing of Building Heating, Ventilation, Air-Conditioning, and Refrigeration Systems.
 3. SMACNA (TAB).
- B. Begin work after completion of systems to be tested, adjusted, or balanced and complete work prior to Substantial Completion of the project.
- C. Where HVAC systems and/or components interface with life safety systems, including fire and smoke detection, alarm, and control, coordinate scheduling and testing and inspection procedures with the authorities having jurisdiction.
- D. TAB Agency Qualifications:
 1. Company specializing in the testing, adjusting, and balancing of systems specified in this section.
 2. Certified by one of the following:
 - a. AABC, Associated Air Balance Council: www.aabc.com/#sle; upon completion submit AABC National Performance Guaranty.
 - b. NEBB, National Environmental Balancing Bureau: www.nebb.org/#sle.
 - c. TABB, The Testing, Adjusting, and Balancing Bureau of National Energy Management Institute: www.tabbcertified.org/#sle.
- E. TAB Supervisor and Technician Qualifications: Certified by same organization as TAB agency.
- F. Approved TAB Agencies:
 1. Baromatic.
 2. Enviroaire.
 3. Controls Solutions Inc. (CSI).
 4. Environmental Testing Services.
 5. Substitutions must be approved by Engineer during Bid Phase.

3.02 EXAMINATION

- A. Verify that systems are complete and operable before commencing work. Ensure the following conditions:
 1. Systems are started and operating in a safe and normal condition.
 2. Temperature control systems are installed complete and operable.
 3. Proper thermal overload protection is in place for electrical equipment.

4. Final filters are clean and in place. If required, install temporary media in addition to final filters.
5. Duct systems are clean of debris.
6. Fans are rotating correctly.
7. Fire and volume dampers are in place and open.
8. Access doors are closed and duct end caps are in place.
9. Air outlets are installed and connected.
10. Duct system leakage is minimized.
11. Service and balance valves are open.

B. Beginning of work means acceptance of existing conditions.

3.03 ADJUSTMENT TOLERANCES

- A. Air Handling Systems: Adjust to within plus or minus 5 percent of design for supply systems and plus or minus 10 percent of design for return and exhaust systems.
- B. Air Outlets and Inlets: Adjust total to within plus 10 percent and minus 5 percent of design to space. Adjust outlets and inlets in space to within plus or minus 10 percent of design.
- C. Hydronic Systems: Adjust to within plus or minus 10 percent of design.

3.04 RECORDING AND ADJUSTING

- A. Ensure recorded data represents actual measured or observed conditions.
- B. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.
- C. Mark on drawings the locations where traverse and other critical measurements were taken and cross reference the location in the final report.
- D. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.
- E. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.

3.05 AIR SYSTEM PROCEDURE

- A. Adjust air handling and distribution systems to provide required or design supply, return, and exhaust air quantities at site altitude.
- B. Make air quantity measurements in ducts by Pitot tube traverse of entire cross sectional area of duct.
- C. Measure air quantities at air inlets and outlets.
- D. Adjust distribution system to obtain uniform space temperatures free from objectionable drafts and noise.
- E. Use volume control devices to regulate air quantities only to extend that adjustments do not create objectionable air motion or sound levels. Effect volume control by duct internal devices such as dampers and splitters.
- F. Vary total system air quantities by adjustment of fan speeds. Provide drive changes required. Vary branch air quantities by damper regulation.
- G. Provide system schematic with required and actual air quantities recorded at each outlet or inlet.
- H. Measure static air pressure conditions on air supply units, including filter and coil pressure drops, and total pressure across the fan. Make allowances for 50 percent loading of filters.
- I. Adjust outside air automatic dampers, outside air, return air, and exhaust dampers for design conditions.

- J. Measure temperature conditions across outside air, return air, and exhaust dampers to check leakage.
- K. Where modulating dampers are provided, take measurements and balance at extreme conditions. Balance variable volume systems at maximum air flow rate, full cooling, and at minimum air flow rate, full heating.
- L. Measure building static pressure and adjust supply, return, and exhaust air systems to provide required relationship between each to maintain approximately 0.05 inches positive static pressure near the building entries.
- M. For variable air volume system powered units set volume controller to air flow setting indicated. Confirm connections properly made and confirm proper operation for automatic variable air volume temperature control.
- N. On fan powered VAV boxes, adjust air flow switches for proper operation.
- O. For fans with variable pitch sheaves: Sheaves in equipment provided by manufacturer are for final belt and sheave sizing ONLY. TAB contractor shall be responsible for providing and installing final sheave and belt for fan.

3.06 SCOPE

- A. Test, adjust, and balance the following:
 - 1. Air Inlets and Outlets.

3.07 MINIMUM DATA TO BE REPORTED

- A. Duct Traverses:
 - 1. System zone/branch.
 - 2. Duct size.
 - 3. Design velocity.
 - 4. Design air flow.
 - 5. Test velocity.
 - 6. Test air flow.
 - 7. Duct static pressure.
 - 8. Air temperature.

**SECTION 230713
DUCT INSULATION**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Duct insulation.
- B. Duct liner.

1.02 RELATED REQUIREMENTS

- A. Section 23 0005 - Basic HVAC Requirements.
- B. Section 23 3100 - HVAC Ducts and Casings: Glass fiber ducts.

1.03 REFERENCE STANDARDS

- A. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus 2017.
- B. ASTM C534/C534M - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form 2020a.
- C. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications 2013 (Reapproved 2019).
- D. ASTM C612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation 2014 (Reapproved 2019).
- E. ASTM C916 - Standard Specification for Adhesives for Duct Thermal Insulation 2020.
- F. ASTM C1071 - Standard Specification for Fibrous Glass Duct Lining Insulation (Thermal and Sound Absorbing Material) 2019.
- G. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2021.
- H. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials 2016.
- I. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi 2015.
- J. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible 2005 (Revised 2009).
- K. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.
- C. Manufacturer's Instructions: Indicate installation procedures necessary to ensure acceptable workmanship and that installation standards will be achieved.

1.05 QUALITY ASSURANCE

- A. Applicator Qualifications: Company specializing in performing the type of work specified in this section and approved by manufacturer.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

- A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

2.02 GLASS FIBER, FLEXIBLE

- A. Manufacturer:
 - 1. CertainTeed Corporation: www.certainteed.com/#sle.
 - 2. Johns Manville: www.jm.com/#sle.
 - 3. Knauf Insulation: www.knaufinsulation.com/#sle.
 - 4. Owens Corning Corporation: www.ocbuildingspec.com/#sle.
 - 5. Substitutions: See Section 01 6000 - Product Requirements.
- B. Insulation: ASTM C553; flexible, noncombustible blanket.
 - 1. K value: 0.36 at 75 degrees F, when tested in accordance with ASTM C518.
 - 2. Maximum Water Vapor Absorption: 5.0 percent by weight.
- C. Vapor Barrier Jacket:
 - 1. Kraft paper with glass fiber yarn and bonded to aluminized film.
 - 2. Secure with pressure sensitive tape.
- D. Vapor Barrier Tape:
 - 1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive rubber based adhesive.
- E. Tie Wire: Annealed steel, 16 gage, 0.0508 inch diameter.

2.03 GLASS FIBER, RIGID

- A. Manufacturer:
 - 1. CertainTeed Corporation: www.certainteed.com/#sle.
 - 2. Johns Manville: www.jm.com/#sle.
 - 3. Knauf Insulation: www.knaufinsulation.com/#sle.
 - 4. Owens Corning Corporation: www.ocbuildingspec.com/#sle.
 - 5. Substitutions: See Section 01 6000 - Product Requirements.
- B. Insulation: ASTM C612; rigid, noncombustible blanket.
 - 1. K Value: 0.24 at 75 degrees F, when tested in accordance with ASTM C518.
 - 2. Maximum Service Temperature: 450 degrees F.
 - 3. Maximum Water Vapor Absorption: 5.0 percent.
- C. Vapor Barrier Jacket:
 - 1. Kraft paper with glass fiber yarn and bonded to aluminized film.
 - 2. Moisture Vapor Permeability: 0.02 perm inch, when tested in accordance with ASTM E96/E96M.
 - 3. Secure with two coats of vapor barrier mastic and glass tape.
- D. Vapor Barrier Tape:
 - 1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive rubber based adhesive.

2.04 FLEXIBLE ELASTOMERIC CELLULAR INSULATION

- A. Manufacturers:
 - 1. Aeroflex USA, Inc: www.aeroflexusa.com/#sle.
 - 2. Armacell LLC: www.armacell.us/#sle.
 - 3. K-Flex USA LLC: www.kflexusa.com/#sle.
 - 4. Substitutions: See Section 01 6000 - Product Requirements
- B. Insulation: Preformed flexible elastomeric cellular rubber insulation complying with ASTM C534/C534M Grade 1, in sheet form.
 - 1. Minimum Service Temperature: Minus 40 degrees F.
 - 2. Maximum Service Temperature: 180 degrees F.

3. Connection: Waterproof vapor barrier adhesive.
- C. Elastomeric Foam Adhesive: Air dried, contact adhesive, compatible with insulation.
- D. Weather Barrier Coating: Air dried, contact adhesive, compatible with insulation and ASTM E84 compliant.

2.05 DUCT LINER

- A. Manufacturers:
 1. CertainTeed Corporation: www.certainteed.com/#sle.
 2. Johns Manville: www.jm.com/#sle.
 3. Knauf Insulation: www.knaufinsulation.com/#sle.
 4. Owens Corning Corporation: www.ocbuildingspec.com/#sle.
 5. Substitutions: See Section 01 6000 - Product Requirements.
- B. Note: Choose the liner type - Elastomeric Foam or Glass Fiber.
- C. Elastomeric Foam Insulation: Preformed flexible elastomeric cellular rubber insulation complying with ASTM C534/C534M Grade 1, in sheet form.
 1. Minimum Service Temperature: Minus 40 degrees F.
 2. Maximum Service Temperature: 180 degrees F.
 3. Connection: Waterproof vapor barrier adhesive.
- D. Glass Fiber Insulation: Non-corrosive, incombustible glass fiber complying with ASTM C1071; rigid board and preformed round liner board; impregnated surface and edges coated with poly vinyl acetate polymer.
 1. Fungal Resistance: No growth when tested according to ASTM G21.
 2. Apparent Thermal Conductivity: Maximum of 0.31 at 75 degrees F.
 3. Service Temperature: Up to 250 degrees F.
 4. Rated Velocity on Coated Air Side for Air Erosion: 5,000 fpm, minimum.
 5. Minimum Noise Reduction Coefficients:
 - a. 1 inch Thickness: 0.45.
- E. Adhesive: Waterproof, fire-retardant type, ASTM C916.
- F. Liner Fasteners: Galvanized steel, self-adhesive pad with integral head.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Test ductwork for design pressure prior to applying insulation materials.
- B. Verify that surfaces are clean, foreign material removed, and dry.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install in accordance with NAIMA National Insulation Standards.
- C. Insulated Ducts Conveying Air Below Ambient Temperature:
 1. Provide insulation with vapor barrier jackets.
 2. Finish with tape and vapor barrier jacket.
 3. Insulate entire system, including fittings, joints, flanges, fire dampers, flexible connections, and expansion joints.
- D. Exterior Applications: Provide insulation with vapor barrier jacket. Cover with with calked aluminum jacket with seams located on bottom side of horizontal duct section.
- E. Slope exterior ductwork to shed water.
- F. External Duct Insulation Application:

1. Secure insulation with vapor barrier with wires and seal jacket joints with vapor barrier adhesive or tape to match jacket.
 2. Secure insulation without vapor barrier with staples, tape, or wires.
 3. Install without sag on underside of duct. Use adhesive or mechanical fasteners where necessary to prevent sagging. Lift duct off trapeze hangers and insert spacers.
 4. Seal vapor barrier penetrations by mechanical fasteners with vapor barrier adhesive.
 5. Stop and point insulation around access doors and damper operators to allow operation without disturbing wrapping.
- G. Duct and Plenum Liner Application:
1. Adhere insulation with adhesive for 90 percent coverage.
 2. Secure insulation with mechanical liner fasteners. Refer to SMACNA (DCS) for spacing.
 3. Seal and smooth joints. Seal and coat transverse joints.
 4. Seal liner surface penetrations with adhesive.
 5. Duct dimensions indicated are net inside dimensions required for air-flow. Increase duct size to allow for insulation thickness.

3.03 SCHEDULES

- A. Exhaust and Relief Ducts Within 10 ft of Exterior Openings:
1. Flexible Glass Fiber Duct Insulation: 1-1/2 inches thick.
- B. Outside Air Intake Ducts:
1. Flexible Glass Fiber Duct Insulation: 1-1/2 inches thick.
- C. Plenums:
1. Flexible Glass Fiber Duct Insulation: 1-1/2 inches thick.
 2. Rigid Glass Fiber Duct Insulation: 1-1/2 inches thick.
- D. Return Air Ducts:
1. Duct Liner: 1 inch thick. First 10 feet from equipment only.
- E. Supply Ducts:
1. Duct Liner: 1 inch thick. First 10 feet from equipment only.
 2. Located in plenum or unconditioned space:
 - a. Flexible Glass Fiber Duct Insulation: 1-1/2 inches thick.
 3. Located exposed in conditioned space:
 - a. No insulation required.
- F. Transfer Ducts:
1. Duct Liner: 1 inch thick. First 10 feet from equipment only.
- G. Ducts Exposed to Outdoors:
1. Flexible Elastomeric Duct Insulation: 2 inches thick
 2. Cover finished insulation with field applied a glass cloth jacket embedded in Foster No. 60-60 fire resistive mastic.

**SECTION 233100
HVAC DUCTS AND CASINGS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Single-wall rectangular ducts and fittings.
- B. Single-wall round ducts and fittings.
- C. Sheet metal materials.
- D. Sealants and gaskets.
- E. Hangers and supports.

1.02 RELATED REQUIREMENTS

- A. Division 03 - Concrete
- B. Division 07 - Thermal Moisture Protection: Firestopping
- C. Section 23 0005 - Basic HVAC Requirements
- D. Section 23 0593 - Testing, Adjusting, and Balancing for HVAC.
- E. Section 23 0713 - Duct Insulation: External insulation and duct liner.
- F. Section 23 3300 - Air Duct Accessories.
- G. Section 23 3700 - Air Outlets and Inlets.

1.03 REFERENCE STANDARDS

- A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel 2014.
- B. ASTM A276/A276M - Standard Specification for Stainless Steel Bars and Shapes 2017.
- C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2020.
- D. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength 2018a.
- E. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate 2014.
- F. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric) 2014.
- G. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems 2018.
- H. NFPA 96 - Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations 2021.
- I. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible 2005 (Revised 2009).
- J. UL 181 - Standard for Factory-Made Air Ducts and Air Connectors current edition, including all revisions.
- K. UL 1978 - Grease Ducts Current Edition, Including All Revisions.
- L. UL 2221 - Tests of Fire Resistive Grease Duct Enclosure Assemblies Current Edition, Including All Revisions.

1.04 PERFORMANCE REQUIREMENTS

- A. Delegated Duct Design: Duct construction, including sheet metal thicknesses, seam and joint construction, reinforcements, and hangers and supports, shall comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" and performance requirements and design criteria indicated in "Duct Schedule" Article.

- B. Structural Performance: Duct hangers and supports shall withstand the effects of gravity loads and stresses within limits and under conditions described in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" and ASCE/SEI 7.
- C. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.

1.05 SUBMITTALS

- A. Contractor shall provide submittals for equipment listed herein. Refer to Division 01 - General Requirements for submittal procedures.
- B. Product Data: Provide data for duct materials, duct liner, duct connections, and factory fabricated fittings.
- C. Shop Drawings: Submit 1/4 scale, double line shop drawings that indicate duct fittings, duct size, bottom of duct elevations, necessary offsets to accommodate building structure, particulars such as gages, sizes, welds, elevations, all fittings, and configuration prior to start of work for all systems.

1.06 REGULATORY REQUIREMENTS

- A. Construct ductwork to SMACNA (DCS) - HVAC Duct Construction Standards - Metal and Flexible; Sheet Metal and Air Conditioning Contractors' National Association; 1995, Second Edition with Addendum No. 1.

PART 2 PRODUCTS

2.01 SINGLE-WALL RECTANGULAR DUCT AND FITTING ASSEMBLIES

- A. Regulatory Requirements: Construct ductwork to comply with NFPA 90A standards.
- B. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" based on indicated static-pressure class unless otherwise indicated.
- C. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-1, "Rectangular Duct/Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- D. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-2, "Rectangular Duct/Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- E. Elbows, Transitions, Offsets, Branch Connections, and Other Duct Construction: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 4, "Fittings and Other Construction," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.02 SINGLE-WALL ROUND DUCT AND FITTING ASSEMBLIES

- A. Regulatory Requirements: Construct ductwork to comply with NFPA 90A standards.
- B. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 3, "Round, Oval, and Flexible Duct," based on indicated static-pressure class unless otherwise indicated.
 - 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. McGill AirFlow LLC.
- b. Spiral Manufacturing Co., Inc.
- C. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-1, "Round Duct Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
 1. Transverse Joints in Ducts Larger Than 60 Inches in Diameter: Flanged.
- D. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-2, "Round Duct Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
 1. Fabricate round ducts larger than 90 inches in diameter with butt-welded longitudinal seams.
- E. Tees and Laterals: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.03 MATERIALS

- A. General Material Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.
- B. Galvanized Steel for Ducts: Hot-dipped galvanized steel sheet, ASTM A653/A653M FS Type B, with G60/Z180 coating.
- C. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.
 1. Galvanized Coating Designation: G90.
 2. Finishes for Surfaces Exposed to View: Mill phosphatized.
- D. Galvanealed Sheet Steel (FOR EXPOSED, PAINTED DUCTWORK): Comply with ASTM A653-09; hot dipped zinc iron coated steel, annealed, coating designation "A" (A60, A40)
- E. Carbon-Steel Sheets: Comply with ASTM A 1008/A 1008M, with oiled, matte finish for exposed ducts.
- F. Stainless-Steel Sheets: Comply with ASTM A 480/A 480M, Type 304 or 316, as indicated in the "Duct Schedule" Article; cold rolled, annealed, sheet. Exposed surface finish shall be No. 2B, No. 2D, No. 3, or No. 4 as indicated in the "Duct Schedule" Article.
- G. Reinforcement Shapes and Plates: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
 1. Where black- and galvanized-steel shapes and plates are used to reinforce aluminum ducts, isolate the different metals with butyl rubber, neoprene, or EPDM gasket materials.
- H. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.
- I. Aluminum for Ducts: ASTM B209 (ASTM B209M); aluminum sheet, alloy 3003-H14. Aluminum Connectors and Bar Stock: Alloy 6061-T651 or of equivalent strength.

2.04 SEALANTS AND GASKETS

- A. General Sealant and Gasket Requirements: Surface-burning characteristics for sealants and gaskets shall be a maximum flame-spread index of 25 and a maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.
- B. Two-Part Tape Sealing System:
 - 1. Tape: Woven cotton fiber impregnated with mineral gypsum and modified acrylic/silicone activator to react exothermically with tape to form hard, durable, airtight seal.
 - 2. Tape Width: 3 inches.
 - 3. Sealant: Modified styrene acrylic.
 - 4. Water resistant.
 - 5. Mold and mildew resistant
 - 6. Maximum Static-Pressure Class: 10-inch wg, positive and negative
 - 7. Service: Indoor and outdoor
 - 8. Service Temperature: Minus 40 to plus 200 deg F.
 - 9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum.
 - 10. For indoor applications, sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - 11. Sealant shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- C. Water-Based Joint and Seam Sealant:
 - 1. Application Method: Brush on.
 - 2. Solids Content: Minimum 65 percent.
 - 3. Shore A Hardness: Minimum 20.
 - 4. Water resistant.
 - 5. Mold and mildew resistant.
 - 6. VOC: Maximum 75 g/L (less water).
 - 7. Maximum Static-Pressure Class: 10-inch wg, positive and negative.
 - 8. Service: Indoor or outdoor.
 - 9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.
- D. Flanged Joint Sealant: Comply with ASTM C 920.
 - 1. General: Single-component, acid-curing, silicone, elastomeric.
 - 2. Type: S.
 - 3. Grade: NS.
 - 4. Class: 25.
 - 5. Use: O.
 - 6. For indoor applications, sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - 7. Sealant shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- E. Flange Gaskets: Butyl rubber, neoprene, or EPDM polymer with polyisobutylene plasticizer.
- F. Round Duct Joint O-Ring Seals:
 - 1. Seal shall provide maximum leakage class of 3 cfm/100 sq. ft. at 1-inch wg and shall be rated for 10-inch wg pressure class, positive or negative.

2.05 HANGERS AND SUPPORTS

- A. Hanger Rods for Noncorrosive Environments: Cadmium-plated steel rods and nuts.

- B. Hanger Rods for Corrosive Environments: Electrogalvanized, all-thread rods or galvanized rods with threads painted with zinc-chromate primer after installation.
- C. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct."
- D. Steel Cables for Galvanized-Steel Ducts: Galvanized steel complying with ASTM A 603.
- E. Steel Cables for Stainless-Steel Ducts: Stainless steel complying with ASTM A 492.
- F. Steel Cable End Connections: Cadmium-plated steel assemblies with brackets, swivel, and bolts designed for duct hanger service; with an automatic-locking and clamping device.
- G. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.
- H. Trapeze and Riser Supports:
 - 1. Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates.
 - 2. Supports for Stainless-Steel Ducts: Stainless-steel shapes and plates.
 - 3. Supports for Aluminum Ducts: Aluminum or galvanized steel coated with zinc chromate.

2.06 DUCTWORK FABRICATION

- A. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.
- B. Provide turning vanes in all mitered elbows.
- C. Construct T's, bends, and elbows with radius of not less than 1-1/2 times width of duct on centerline. Where not possible and where rectangular elbows must be used, provide air foil turning vanes of perforated metal with glass fiber insulation.
- D. T's, bends, and elbows: construct according to SMACNA (DCS).
- E. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.
- F. Fabricate continuously welded round and oval duct fittings in accordance with SMACNA (DCS).
- G. Fabricate continuously welded round and oval duct fittings two gages heavier than duct gages indicated in SMACNA Standard. Joints shall be minimum 4 inch cemented slip joint, brazed or electric welded. Prime coat welded joints.
- H. Provide standard 45 degree lateral wye takeoffs unless otherwise indicated where 90 degree conical tee connections may be used.
- I. Where ducts are connected to exterior wall louvers and duct outlet is smaller than louver frame, provide blank-out panels sealing louver area around duct. Use same material as duct, painted black on exterior side; seal to louver frame and duct.

2.07 MANUFACTURED DUCTWORK AND FITTINGS

- A. Manufacture in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.
- B. Flat Oval Ducts: Machine made from round spiral lockseam duct.
 - 1. Manufacture in accordance with SMACNA (DCS).
 - 2. Fittings: Manufacture at least two gages heavier metal than duct.
 - 3. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.
- C. Flexible Ducts: Black polymer film supported by helically wound spring steel wire.
 - 1. UL labeled.
 - 2. Insulation: Fiberglass insulation with polyethylene vapor barrier film.

3. Pressure Rating: 4 inches WG positive and 0.5 inches WG negative.
 4. Maximum Velocity: 4000 fpm.
 5. Temperature Range: Minus 20 degrees F to 175 degrees F.
- D. Kitchen Cooking Hood and Grease Exhaust: Nominal 3 inches thick ceramic fiber insulation between 20 gage, 0.0375 inch, Type 304 stainless steel liner and 24 gage, 0.0239 inch aluminized steel sheet outer jacket.
1. Tested and UL listed for use with commercial cooking equipment in accordance with NFPA 96.
 2. Certified for zero clearance to combustible material in accordance with:
 - a. UL 2221 with a 2 hour rating.
 3. Materials and construction of the modular sections and accessories to be in accordance with the terms of the following listings:
 - a. UL 1978.
 - b. UL 2221.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install, support, and seal ducts in accordance with SMACNA (DCS).
- B. Install in accordance with manufacturer's instructions.
- C. Drawing plans, schematics, and diagrams indicate general location and arrangement of duct system. Indicated duct locations, configurations, and arrangements were used to size ducts and calculate friction loss for air-handling equipment sizing and for other design considerations. Install duct systems as indicated unless deviations to layout are approved on Shop Drawings and Coordination Drawings.
- D. Install ducts according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" unless otherwise indicated.
- E. Install round ducts in maximum practical lengths.
- F. Install ducts with fewest possible joints.
- G. Install factory- or shop-fabricated fittings for changes in direction, size, and shape and for branch connections.
- H. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines.
- I. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.
- J. Install ducts with a clearance of 1 inch, plus allowance for insulation thickness.
- K. Route ducts to avoid passing through transformer vaults and electrical equipment rooms and enclosures.
- L. Where ducts pass through non-fire-rated interior partitions and exterior walls and are exposed to view, cover the opening between the partition and duct or duct insulation with sheet metal flanges of same metal thickness as the duct. Overlap openings on four sides by at least 1-1/2 inches.
- M. Where ducts pass through fire-rated interior partitions and exterior walls, install fire dampers. Comply with requirements in Section 233300 "Air Duct Accessories" for fire and smoke dampers.
- N. Protect duct interiors from moisture, construction debris and dust, and other foreign materials. Comply with SMACNA's "IAQ Guidelines for Occupied Buildings Under Construction," Appendix G, "Duct Cleanliness for New Construction Guidelines."

- O. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.
- P. Kitchen Hood Exhaust: Provide residue traps at base of vertical risers with provisions for clean out.
- Q. Duct sizes indicated are inside clear dimensions. For lined ducts, maintain sizes inside lining.
- R. Use crimp joints with or without bead for joining round duct sizes 8 inch and smaller with crimp in direction of air flow.
- S. Use double nuts and lock washers on threaded rod supports.

3.02 HANGERS AND SUPPORT INSTALLATION

- A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 5, "Hangers and Supports."
- B. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.
 - 1. Where practical, install concrete inserts before placing concrete.
 - 2. Install powder-actuated concrete fasteners after concrete is placed and completely cured.
 - 3. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches thick.
 - 4. Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches thick.
 - 5. Do not use powder-actuated concrete fasteners for seismic restraints.
- C. Hanger Spacing: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct," for maximum hanger spacing; install hangers and supports within 24 inches of each elbow and within 48 inches of each branch intersection.
- D. Hangers Exposed to View: Threaded rod and angle or channel supports.
- E. Support vertical ducts with steel angles or channel secured to the sides of the duct with welds, bolts, sheet metal screws, or blind rivets; support at each floor and at a maximum intervals of 16 feet.
- F. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

3.03 INSTALLATION OF EXPOSED DUCTWORK

- A. Protect ducts exposed in finished spaces from being dented, scratched, or damaged.
- B. Trim duct sealants flush with metal. Create a smooth and uniform exposed bead. Do not use two-part tape sealing system.
- C. Grind welds to provide smooth surface free of burrs, sharp edges, and weld splatter. When welding stainless steel with a No. 3 or 4 finish, grind the welds flush, polish the exposed welds, and treat the welds to remove discoloration caused by welding.
- D. Maintain consistency, symmetry, and uniformity in the arrangement and fabrication of fittings, hangers and supports, duct accessories, and air outlets.
- E. Repair or replace damaged sections and finished work that does not comply with these requirements.

3.04 DUCT SEALING

- A. Seal ducts for duct static-pressure, seal classes, and leakage classes specified in "Duct Schedule" Article according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

- B. Seal ducts to the following seal classes according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible":
1. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
 2. Outdoor, Supply-Air Ducts: Seal Class A.
 3. Outdoor, Exhaust Ducts: Seal Class C.
 4. Outdoor, Return-Air Ducts: Seal Class C.
 5. Unconditioned Space, Supply-Air Ducts in Pressure Classes 2-Inch wg and Lower: Seal Class B.
 6. Unconditioned Space, Supply-Air Ducts in Pressure Classes Higher Than 2-Inch wg: Seal Class A.
 7. Unconditioned Space, Exhaust Ducts: Seal Class C.
 8. Unconditioned Space, Return-Air Ducts: Seal Class B.
 9. Conditioned Space, Supply-Air Ducts in Pressure Classes 2-Inch wg and Lower: Seal Class C.
 10. Conditioned Space, Supply-Air Ducts in Pressure Classes Higher Than 2-Inch wg: Seal Class B.
 11. Conditioned Space, Exhaust Ducts: Seal Class B.
 12. Conditioned Space, Return-Air Ducts: Seal Class C.
 13. All locations, Laboratory Exhaust Ducts: Seal Class A.

3.05 DUCT CLEANING

- A. Clean new duct system(s) before testing, adjusting, and balancing.
- B. Use service openings for entry and inspection.
1. Create new openings and install access panels appropriate for duct static-pressure class if required for cleaning access. Provide insulated panels for insulated or lined duct. Patch insulation and liner as recommended by duct liner manufacturer. Comply with Section 233300 "Air Duct Accessories" for access panels and doors.
 2. Disconnect and reconnect flexible ducts as needed for cleaning and inspection.
 3. Remove and reinstall ceiling to gain access during the cleaning process.
- C. Particulate Collection and Odor Control:
1. When venting vacuuming system inside the building, use HEPA filtration with 99.97 percent collection efficiency for 0.3-micron-size (or larger) particles.
 2. When venting vacuuming system to outdoors, use filter to collect debris removed from HVAC system, and locate exhaust downwind and away from air intakes and other points of entry into building.
- D. Clean the following components by removing surface contaminants and deposits:
1. Air outlets and inlets (registers, grilles, and diffusers).
 2. Supply, return, and exhaust fans including fan housings, plenums (except ceiling supply and return plenums), scrolls, blades or vanes, shafts, baffles, dampers, and drive assemblies.
 3. Air-handling unit internal surfaces and components including mixing box, coil section, air wash systems, spray eliminators, condensate drain pans, humidifiers and dehumidifiers, filters and filter sections, and condensate collectors and drains.
 4. Coils and related components.
 5. Return-air ducts, dampers, actuators, and turning vanes except in ceiling plenums and mechanical equipment rooms.
 6. Supply-air ducts, dampers, actuators, and turning vanes.
 7. Dedicated exhaust and ventilation components and makeup air systems.
- E. Mechanical Cleaning Methodology:

1. Clean metal duct systems using mechanical cleaning methods that extract contaminants from within duct systems and remove contaminants from building.
2. Use vacuum-collection devices that are operated continuously during cleaning. Connect vacuum device to downstream end of duct sections so areas being cleaned are under negative pressure.
3. Use mechanical agitation to dislodge debris adhered to interior duct surfaces without damaging integrity of metal ducts, duct liner, or duct accessories.
4. Clean fibrous-glass duct liner with HEPA vacuuming equipment; do not permit duct liner to get wet. Replace fibrous-glass duct liner that is damaged, deteriorated, or delaminated or that has friable material, mold, or fungus growth.
5. Clean coils and coil drain pans according to NADCA 1992. Keep drain pan operational. Rinse coils with clean water to remove latent residues and cleaning materials; comb and straighten fins.
6. Provide drainage and cleanup for wash-down procedures.
7. Antimicrobial Agents and Coatings: Apply EPA-registered antimicrobial agents if fungus is present. Apply antimicrobial agents according to manufacturer's written instructions after removal of surface deposits and debris.

3.06 FIELD QUALITY CONTROLS

- A. Perform tests and inspections.
- B. Leakage Tests:
 1. Comply with SMACNA's "HVAC Air Duct Leakage Test Manual." Submit a test report for each test.
 2. Test the following systems:
 - a. Ducts with a Pressure Class Higher Than 3-Inch wg: Test representative duct sections, selected by Architect from sections installed, totaling no less than 25 percent of total installed duct area for each designated pressure class.
 3. Disassemble, reassemble, and seal segments of systems to accommodate leakage testing and for compliance with test requirements.
 4. Keep open ends of ductwork covered during construction.
 5. Test for leaks before applying external insulation.
 6. Conduct tests at static pressures equal to maximum design pressure of system or section being tested. If static-pressure classes are not indicated, test system at maximum system design pressure. Do not pressurize systems above maximum design operating pressure.
 7. Give seven days' advance notice for testing.
- C. Duct System Cleanliness Tests:
 1. Visually inspect duct system to ensure that no visible contaminants are present.
 2. Test sections of metal duct system, chosen randomly by Owner, for cleanliness according to "Vacuum Test" in NADCAACR, "Assessment, Cleaning and Restoration of HVAC Systems."
 - a. Acceptable Cleanliness Level: Net weight of debris collected on the filter media shall not exceed 0.75 mg/100 sq. cm.
- D. Duct system will be considered defective if it does not pass tests and inspections.
- E. Prepare test and inspection reports.

3.07 SCHEDULES

- A. Supply Ducts:
 1. Ducts Connected to Fan Coil Units, Furnaces, Heat Pumps, and Terminal Units:
 - a. Pressure Class: Positive 1-inch wg.
 - b. Minimum SMACNA Seal Class: C.
 - c. SMACNA Leakage Class for Rectangular: 12

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- d. SMACNA Leakage Class for Round and Flat Oval: 6.
 2. Ducts Connected to Constant-Volume Air-Handling Units:
 - a. Pressure Class: Positive 4-inch wg.
 - b. Minimum SMACNA Seal Class: A.
 - c. SMACNA Leakage Class for Rectangular: 6.
 - d. SMACNA Leakage Class for Round and Flat Oval: 3.
 3. Ducts Connected to Variable-Air-Volume Air-Handling Units:
 - a. Pressure Class: Positive 4-inch wg.
 - b. Minimum SMACNA Seal Class: A.
 - c. SMACNA Leakage Class for Rectangular: 6.
 - d. SMACNA Leakage Class for Round and Flat Oval: 3.
- B. Return Ducts:
1. Ducts Connected to Fan Coil Units, Furnaces, Heat Pumps, and Terminal Units:
 - a. Pressure Class: Positive or negative 1-inch wg.
 - b. Minimum SMACNA Seal Class: B.
 - c. SMACNA Leakage Class for Rectangular: 12.
 - d. SMACNA Leakage Class for Round and Flat Oval: 6.
 2. Ducts Connected to Air-Handling Units:
 - a. Pressure Class: Positive or negative 4-inch wg.
 - b. Minimum SMACNA Seal Class: A.
 - c. SMACNA Leakage Class for Rectangular: 6.
 - d. SMACNA Leakage Class for Round and Flat Oval: 3.
- C. Exhaust Ducts:
1. Ducts Connected to Fans Exhausting (ASHRAE 62.1, Class 1 and 2) Air:
 - a. Pressure Class: Negative 2-inch wg.
 - b. Minimum SMACNA Seal Class: C if negative pressure, and A if positive pressure.
 - c. SMACNA Leakage Class for Rectangular: 24.
 - d. SMACNA Leakage Class for Round and Flat Oval: 12.
 2. Ducts Connected to Fans Exhausting Laboratory and Process (ASHRAE 62.1, Class 3 and 4) Air:
 - a. Type 316, stainless-steel sheet.
 - 1) Exposed to View: No. 4 finish.
 - 2) Concealed: No. 2D finish.
 - b. Pressure Class: Positive or negative 6-inch wg.
 - c. Minimum SMACNA Seal Class: A.
 - d. SMACNA Leakage Class: 3.
- D. Outdoor-Air (Not Filtered, Heated, or Cooled) Ducts:
1. Ducts Connected to Fan Coil Units, Furnaces, Heat Pumps, and Terminal Units:
 - a. Pressure Class: Positive or negative 2-inch wg.
 - b. Minimum SMACNA Seal Class: B.
 - c. SMACNA Leakage Class for Rectangular: 12.
 - d. SMACNA Leakage Class for Round and Flat Oval: 6.
 2. Ducts Connected to Air-Handling Units:
 - a. Pressure Class: Positive or negative 2-inch wg.
 - b. Minimum SMACNA Seal Class: B.
 - c. SMACNA Leakage Class for Rectangular: 12.
 - d. SMACNA Leakage Class for Round and Flat Oval: 6.
- E. Intermediate Reinforcement:
1. Stainless-Steel Ducts:

- a. Exposed to Airstream: Match duct material.
 - b. Not Exposed to Airstream: Match duct material.
- F. Elbow Configuration:
1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-2, "Rectangular Elbows."
 - a. Velocity 1000 fpm or Lower:
 - 1) Radius Type RE 1 with minimum 0.5 radius-to-diameter ratio.
 - 2) Mitered Type RE 4 without vanes.
 - b. Velocity 1000 to 1500 fpm:
 - 1) Radius Type RE 1 with minimum 1.0 radius-to-diameter ratio.
 - 2) Radius Type RE 3 with minimum 0.5 radius-to-diameter ratio and two vanes.
 - 3) Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."
 - c. Velocity 1500 fpm or Higher:
 - 1) Radius Type RE 1 with minimum 1.5 radius-to-diameter ratio.
 - 2) Radius Type RE 3 with minimum 1.0 radius-to-diameter ratio and two vanes.
 - 3) Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."
 2. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-2, "Rectangular Elbows."
 - a. Radius Type RE 1 with minimum 1.5 radius-to-diameter ratio.
 - b. Radius Type RE 3 with minimum 1.0 radius-to-diameter ratio and two vanes.
 - c. Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."
 3. Round Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-4, "Round Duct Elbows."
 - a. Minimum Radius-to-Diameter Ratio and Elbow Segments: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 3-1, "Mitered Elbows." Elbows with less than 90-degree change of direction have proportionately fewer segments.
 - 1) Velocity 1000 fpm or Lower: 0.5 radius-to-diameter ratio and three segments for 90 degree elbow.
 - 2) Velocity 1000 to 1500 fpm: 1.0 radius-to-diameter ratio and four segments for 90 degree elbow.
 - 3) Velocity 1500 fpm or Higher: 1.5 radius-to-diameter ratio and five segments for 90 degree elbow.
 - 4) Radius-to Diameter Ratio: 1.5.
 - b. Round Elbows, 12 Inches and Smaller in Diameter: Stamped or pleated.
 - c. Round Elbows, 14 Inches and Larger in Diameter: Welded.
- G. Branch Configuration:
1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-6, "Branch Connection."
 - a. Rectangular Main to Rectangular Branch: 45-degree entry.
 - b. Rectangular Main to Round Branch: Spin in.
 - 1) Round and Flat Oval: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees." Saddle taps are permitted in existing duct.
 - c. Velocity 1000 fpm or Lower: 90-degree tap.

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- d. Velocity 1000 to 1500 fpm: Conical tap.
- e. Velocity 1500 fpm or Higher: 45-degree lateral.

**SECTION 233300
AIR DUCT ACCESSORIES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Air turning devices/extractors.
- B. Backdraft dampers - metal.
- C. Backdraft dampers - fabric.
- D. Combination fire and smoke dampers.
- E. Duct access doors.
- F. Duct test holes.
- G. Fire dampers.
- H. Flexible duct connectors.
- I. Smoke dampers.
- J. Volume control dampers.

1.02 RELATED REQUIREMENTS

- A. Division 01 - General Requirements: Project procedural and administrative requirements.
- B. Division 07 - Thermal and Moisture Protection: Firestopping
- C. Section 23 0005 - Basic HVAC Requirements
- D. Section 23 3100 - HVAC Ducts and Casings.
- E. Section 23 3600 - Air Terminal Units: Pressure regulating damper assemblies.

1.03 REFERENCE STANDARDS

- A. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems 2018.
- B. NFPA 92 - Standard for Smoke Control Systems 2018.
- C. NFPA 96 - Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations 2021.
- D. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible 2005 (Revised 2009).
- E. UL 33 - Safety Heat Responsive Links for Fire-Protection Service Current Edition, Including All Revisions.
- F. UL 555 - Standard for Fire Dampers Current Edition, Including All Revisions.
- G. UL 555S - Standard for Smoke Dampers Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. Contractor shall provide submittals for equipment listed herein. Refer to Division 01 - General Requirements for submittal procedures.
- B. Product Data: Provide for shop fabricated assemblies including volume control dampers. Include electrical characteristics and connection requirements.

1.05 QUALITY ASSURANCE

- A. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.01 AIR TURNING DEVICES/EXTRACTORS

- A. Multi-blade device with blades aligned in short dimension; steel construction; with individually adjustable blades, mounting straps.

2.02 BACKDRAFT DAMPERS - METAL

- A. Multi-Blade, Parallel Action Gravity Balanced Backdraft Dampers: Galvanized steel, with center pivoted blades of maximum 6 inch width, with felt or flexible vinyl sealed edges, linked together in rattle-free manner with 90 degree stop, steel ball bearings, and plated steel pivot pin; adjustment device to permit setting for varying differential static pressure.

2.03 BACKDRAFT DAMPERS - FABRIC

- A. Fabric Backdraft Dampers: Factory-fabricated.
 - 1. Blades: Neoprene coated fabric material.
 - 2. Birdscreen: 1/2 inch nominal mesh of galvanized steel or aluminum.
 - 3. Maximum Velocity: 1000 fpm (5 mps) face velocity.

2.04 COMBINATION FIRE AND SMOKE DAMPERS

- A. Manufacturers:
 - 1. Nailor Industries, Inc: www.nailor.com.
 - 2. Ruskin Company: www.ruskin.com.
 - 3. United Enertech: www.unitedenertech.com.
 - 4. Greenheck: www.greenheck.com.
 - 5. Substitutions: See Section 01 6000 - Product Requirements.
- B. Fabricate in accordance with NFPA 90A, UL 555, UL 555S, and as indicated.
- C. Provide factory sleeve and collar for each damper.
- D. Multiple Blade Dampers: Fabricate with 16 gage, 0.0598 inch galvanized steel frame and blades, oil-impregnated bronze or stainless steel sleeve bearings and plated steel axles, stainless steel jamb seals, 1/8 by 1/2 inch plated steel concealed linkage, stainless steel closure spring, blade stops, and lock, and 1/2 inch actuator shaft.
- E. Operators: UL listed and labelled spring return electric type suitable for 120 volts, single phase, 60 Hz. Provide end switches to indicate damper position. Locate damper operator on interior of duct and link to damper operating shaft.
- F. Normally Open Smoke Responsive Fire Dampers: Curtain type, closing upon actuation of electro thermal link, flexible stainless steel blade edge seals to provide constant sealing pressure, stainless steel springs with locking devices to ensure positive closure for units mounted horizontally.
- G. Electro Thermal Link: Fusible link melting at 165 degrees F; 120 volts, single phase, 60 Hz; UL listed and labeled.

2.05 DUCT ACCESS DOORS

- A. Fabricate in accordance with SMACNA (DCS) and as indicated.

2.06 DUCT TEST HOLES

- A. Temporary Test Holes: Cut or drill in ducts as required. Cap with neat patches, neoprene plugs, threaded plugs, or threaded or twist-on metal caps.
- B. Permanent Test Holes: Factory fabricated, air tight flanged fittings with screw cap. Provide extended neck fittings to clear insulation.

2.07 FIRE DAMPERS

- A. Manufacturers:
 - 1. Nailor Industries, Inc: www.nailor.com.
 - 2. Ruskin Company: www.ruskin.com.

3. United Enertech: www.unitedenertech.com.
 4. Greenheck: www.greenheck.com.
 5. Substitutions: See Section 01 6000 - Product Requirements.
- B. Fabricate in accordance with NFPA 90A and UL 555, and as indicated.
 - C. Curtain Type Dampers: Galvanized steel with interlocking blades. Provide stainless steel closure springs and latches for horizontal installations. Configure with blades out of air stream except for 1.0 inch pressure class ducts up to 12 inches in height.
 - D. Fusible Links: UL 33, separate at 165 degrees F with adjustable link straps for combination fire/balancing dampers.

2.08 FLEXIBLE DUCT CONNECTORS

- A. Fabricate in accordance with SMACNA (DCS) and as indicated.
- B. Flexible Duct Connections: Fabric crimped into metal edging strip.

2.09 SMOKE DAMPERS

- A. Manufacturers:
 1. Nailor Industries, Inc: www.nailor.com.
 2. Ruskin Company: www.ruskin.com.
 3. United Enertech: www.unitedenertech.com.
 4. Greenheck: www.greenheck.com.
 5. Substitutions: See Section 01 6000 - Product Requirements.
- B. Fabricate in accordance with NFPA 90A and UL 555S, and as indicated.
- C. Dampers: UL Class 1 airfoil blade type smoke damper, normally open automatically operated by electric actuator.

2.10 VOLUME CONTROL DAMPERS

- A. Fabricate in accordance with SMACNA (DCS) and as indicated.
- B. Single Blade Dampers:
 1. Blade: 24 gage, 0.0239 inch, minimum.
- C. Multi-Blade Damper: Fabricate of opposed blade pattern with maximum blade sizes 8 by 72 inch. Assemble center and edge crimped blades in prime coated or galvanized channel frame with suitable hardware.
 1. Blade: 18 gage, 0.0478 inch, minimum.
- D. End Bearings: Except in round ducts 12 inches and smaller, provide end bearings. On multiple blade dampers, provide oil-impregnated nylon, thermoplastic elastomer, or sintered bronze bearings.
- E. Quadrants:
 1. Provide locking, indicating quadrant regulators on single and multi-blade dampers.
 2. On insulated ducts mount quadrant regulators on stand-off mounting brackets, bases, or adapters.
 3. Where rod lengths exceed 30 inches provide regulator at both ends.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install accessories in accordance with manufacturer's instructions, NFPA 90A, and follow SMACNA (DCS). Refer to Section 23 3100 for duct construction and pressure class.
- B. Provide backdraft dampers on exhaust fans or exhaust ducts nearest to outside and where indicated.

- C. Provide duct access doors for inspection and cleaning before and after filters, coils, fans, automatic dampers, at fire dampers, combination fire and smoke dampers, and elsewhere as indicated. Provide for cleaning kitchen exhaust ducts in accordance with NFPA 96 Provide minimum 8 by 8 inch size for hand access, size for shoulder access, and as indicated. Provide 4 by 4 inch for balancing dampers only. Review locations prior to fabrication.
- D. Provide duct test holes where indicated and required for testing and balancing purposes.
- E. Provide fire dampers, combination fire and smoke dampers, and smoke dampers at locations indicated, where ducts and outlets pass through fire rated components, and where required by Authorities Having Jurisdiction. Install with required perimeter mounting angles, sleeves, breakaway duct connections, corrosion resistant springs, bearings, bushings and hinges.
- F. Install smoke dampers and combination smoke and fire dampers in accordance with NFPA 92.
- G. Demonstrate re-setting of fire dampers to Owner's representative.
- H. At fans and motorized equipment associated with ducts, provide flexible duct connections immediately adjacent to the equipment.
- I. Provide balancing dampers at points on supply, return, and exhaust systems where branches are taken from larger ducts as required for air balancing. Install minimum 2 duct widths from duct take-off.
- J. Provide balancing dampers on duct take-off to diffusers, grilles, and registers, regardless of whether dampers are specified as part of the diffuser, grille, or register assembly.

**SECTION 233700
AIR OUTLETS AND INLETS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Diffusers:
 - 1. Perforated ceiling diffusers.
 - 2. Rectangular ceiling diffusers.
- B. Registers/grilles:
 - 1. Ceiling-mounted, egg crate exhaust and return register/grilles.
 - 2. Wall-mounted, supply register/grilles.
 - 3. Wall-mounted, exhaust and return register/grilles.
- C. Duct-mounted supply and return registers/louvers.
- D. Louvers:

1.02 RELATED REQUIREMENTS

- A. Division 01 - General Requirements: Project procedural and administrative requirements.
- B. Division 09 - Finishes: Painting of ducts and visible behind outlets and inlets.
- C. Section 09 9123 - Interior Painting: Painting of ducts visible behind outlets and inlets.

1.03 REFERENCE STANDARDS

- A. AMCA 500-L - Laboratory Methods of Testing Louvers for Rating 2015.
- B. ASHRAE Std 70 - Method of Testing the Performance of Air Outlets and Inlets 2006 (Reaffirmed 2011).

1.04 SUBMITTALS

- A. Contractor shall provide submittals for equipment listed herein. Refer to Division 01 - General Requirements for submittal procedures.
- B. Product Data: Provide data for equipment required for this project. Review outlets and inlets as to size, finish, and type of mounting prior to submission. Submit schedule of outlets and inlets showing type, size, location, application, and noise level.

1.05 QUALITY ASSURANCE

- A. Test and rate air outlet and inlet performance in accordance with ASHRAE Std 70.
- B. Test and rate louver performance in accordance with AMCA 500-L.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Krueger-HVAC: www.krueger-hvac.com.
- B. Price Industries: www.price-hvac.com.
- C. Titus, a brand of Air Distribution Technologies: www.titus-hvac.com.

2.02 RECTANGULAR CEILING DIFFUSERS

- A. Type: Provide square, plaque face diffuser to discharge air in 360 degree pattern with sectorizing baffles where indicated.
- B. Connections: Round.
- C. Frame: Provide surface mount, snap-in, inverted T-bar, spline, and _____ type. In plaster ceilings, provide plaster frame and ceiling frame.
- D. Fabrication: Steel with baked enamel finish.

- E. Color: As indicated.
- F. Accessories: Provide radial opposed blade, butterfly, combination splitter, and _____ volume control damper; removable core, sectorizing baffle, safety chain, wire guard, equalizing grid, operating rod extension, anti-smudging device, gaskets for surface mounted diffusers, and _____ with damper adjustable from diffuser face.

2.03 PERFORATED FACE CEILING DIFFUSERS

- A. Type: Perforated face with fully adjustable pattern and removable face.
- B. Frame: Surface mount type. In plaster ceilings, provide plaster frame and ceiling frame.
- C. Fabrication: Steel with steel frame and baked enamel finish.
- D. Color: As indicated.
- E. Accessories: Radial opposed blade damper and multi-louvered equalizing grid with damper adjustable from diffuser face.

2.04 DUCT-MOUNTED SUPPLY AND RETURN REGISTERS/LOUVERS

- A. Type: Duct-mounted, rectangular register for round-spiral duct with adjustable pivot-ended blades, end caps, built-in volume damper, and dual cover flanges to lay flush on duct surface regardless of diameter. Performance to match manufacturer's catalog data.
- B. Material: 22 gage, 0.0299 inch.
- C. Color: As indicated on drawings.

2.05 CEILING EGG CRATE EXHAUST AND RETURN GRILLES

- A. Type: Egg crate style face consisting of 1/2 by 1/2 by 1/2 inch grid core.
- B. Fabrication: Grid core consists of aluminum with mill aluminum finish.
- C. Color: As indicated.
- D. Frame: 1-1/4 inch margin with countersunk screw mounting.
- E. Accessories: Provide integral, gang & face operated opposed blade damper, 2 inch filter frame, plaster frame, square mesh insect screen, square mesh debris screen, prescored molded fiberglass back, 45 degree angled eggcrate or other similar provisions for visual blocking such as angled louver, 90 degree duct elbow, etc., and _____.

2.06 WALL SUPPLY REGISTERS/GRILLES

- A. Type: Streamlined and individually adjustable blades, 3/4 inch minimum depth, 3/4 inch maximum spacing with spring or other device to set blades, vertical face, single deflection.
- B. Frame: 1-1/4 inch margin with countersunk screw mounting and gasket.
- C. Fabrication: Steel with 20 gage, 0.0359 inch minimum frames and 22 gage, 0.0299 inch minimum blades, steel and aluminum with 20 gage, 0.0359 inch minimum frame, or aluminum extrusions, with factory baked enamel finish.
- D. Color: As indicated.
- E. Damper: Integral, gang-operated opposed blade type with removable key operator, operable from face.

2.07 WALL EXHAUST AND RETURN REGISTERS/GRILLES

- A. Type: Streamlined blades, 3/4 inch minimum depth, 3/4 inch maximum spacing, with spring or other device to set blades, vertical face.
- B. Frame: 1-1/4 inch margin with countersunk screw mounting.
- C. Fabrication: Steel frames and blades, with factory baked enamel finish.
- D. Color: As indicated on the drawings.

- E. Damper: Integral, gang-operated, opposed blade type with removable key operator, operable from face.

2.08 LOUVERS

2.09 INTAKE AND RELIEF LOUVERS

- A. Louver Manufacturers:
 - 1. Greenheck .
 - 2. Ruskin.
- B. Quality Assurance:
 - 1. Louvers licensed to bear AMCA Certified Ratings Seal. Ratings based on tests and procedures performed in accordance with AMCA 511 and comply with AMCA Certified Ratings Program. AMCA Certified Ratings Seal applies to air performance and water penetration ratings.
- C. Fabrication:
 - 1. Frame:
 - a. Material: Extruded aluminum, Alloy 6063-T5.
 - b. Wall Thickness: 0.081 inch (2.1mm), nominal.
 - c. Depth: 6 inches.
 - d. Downspouts and caulking surfaces.
 - 2. Blades:
 - a. Style: Drainable.
 - b. Material: Extruded aluminum, Alloy 6063-T5.
 - c. Wall Thickness: 0.081 inch (2.1mm), nominal.
 - d. Angle: 37 degrees.
 - e. Centers: 6 inches.
 - 3. Bird Screen:
 - a. Material: Aluminum, 3/4 inch x 0.51 inch expanded, flattened.
 - b. Frame: Removeable, rewireable.
 - 4. Gutters: Drain gutters in head frame at each blade.
 - 5. Downspouts: Downspouts in jambs to drain water from louver for minimum water cascade from blade to blade.
 - 6. Vertical Supports: Hidden vertical supports to allow continuous line appearance up to 120 inches.
 - 7. Sill: Steeple angles integral sill eliminating areas of standing or trapped moisture where mold or mildew may thrive and effect indoor air quality.
 - 8. Assembly: Factory assemble louver components.
- D. Performance Data:
 - 1. Design Load: Incorporate structural supports required to withstand wind load of 25 pounds per square foot (100 mph wind equivalent).
- E. Accessories:
 - 1. Blank-Off Panels: 0.063 inch extruded aluminum, 2 inch insulated core finish to match louver.
 - 2. Insect Screen: Aluminum mech construction.
- F. Factory Finish:
 - 1. Baked Enamel Finish:
 - a. Color shall be as selected by architect.
 - b. Finish to be applied after a thorough cleaning and preparation of the metal surface.
 - c. Total dry film thickness: 1.2 mils.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Check location of outlets and inlets and make necessary adjustments in position to comply with architectural features, symmetry, and lighting arrangement.
- C. Install diffusers to ductwork with air tight connection.
- D. Provide balancing dampers on duct take-off to diffusers, and grilles and registers, despite whether dampers are specified as part of the diffuser, or grille and register assembly.
- E. Paint ductwork visible behind air outlets and inlets matte black. Refer to Section 09 9123.

**SECTION 260005
BASIC ELECTRICAL REQUIREMENTS**

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. This section applies to all sections of Division 26 and Division 28.
- B. Drawings and general provisions of the contract, including Division 00 and Division 01 specification sections, apply to work of this section.
- C. Provide all items, articles, materials, operations or methods listed, mentioned or scheduled on drawings and/or herein, including all labor, materials, equipment and incidentals necessary and required for their completion.
- D. The items in this section are supplementary to the requirements set forth in other portions of the specifications as indicated under Item "A" above.

1.02 DRAWINGS

- A. The drawings show the location and general arrangement of equipment, electrical systems and related items. They shall be followed as closely as elements of the construction will permit.
- B. Examine the drawings of other trades and verify the conditions governing the work on the job site. Arrange work accordingly, providing such fittings, conduit, junction boxes and accessories as may be required to meet such conditions.
- C. Deviations from the drawings, with the exception of minor changes in routing and other such incidental changes that do not affect the functioning or serviceability of the systems, shall not be made without the written approval of the Architect/Engineer.
- D. The architectural and structural drawings take precedence in all matters pertaining to the building structure, mechanical drawings in all matters pertaining to mechanical trades and electrical drawings in all matters pertaining to electrical trades. Where there are conflicts or differences between the drawings for the various trades, report such conflicts or differences to the Architect/Engineer for resolution.

1.03 INSPECTION OF SITE

- A. Visit the site, examine and verify the conditions under which the work must be conducted before submitting proposal.
- B. The submitting of a proposal implies that the contractor has visited the site and understands the conditions under which the work must be conducted.

1.04 TEMPORARY FACILITIES

- A. Provide and remove upon completion of the project, in accordance with the general conditions, a complete temporary electrical and telephone service during construction.

1.05 ALTERNATES

- A. Refer to Division 01 - General Requirements for procedures.

1.06 GUARANTEE

- A. Contractor guarantees that the installation is free from defects and agrees to replace or repair, any part of this installation which becomes defective within a period of one year following final acceptance, unless noted otherwise, provided that such failure is due to defects in the equipment, material or installation or to follow the specifications and drawings. File with the Owner any and all guarantees from the equipment manufacturers.

1.07 CODES, PERMITS AND FEES

- A. Unless otherwise indicated, all required permits, licenses, inspections, approvals and fees for electrical work shall be secured and paid for by the contractor. All work shall conform to all

applicable codes, rules and regulations. Applicable publications listed in all sections of Division 26 shall be the latest issue, unless otherwise noted.

- B. Rules of local utility companies shall be complied with. Check with the utility company supplying service to the installation and determine all devices including, but not limited to, all current and potential transformers, meter boxes, C.T. cabinets and meters which will be required and include the cost of all such items in proposal.
- C. All work shall be executed in accordance with the rules and regulations set forth in local and state codes. Prepare any detailed drawings or diagrams which may be required by the governing authorities. Where the drawings and/or specifications indicate materials or construction in excess of code requirements, the drawings and/or specifications shall govern.

1.08 STANDARDS OF MATERIAL AND WORKMANSHIP:

- A. All materials shall be new, unless noted otherwise. The electrical and physical properties of all materials, and the design, performance characteristics, and methods of construction of all items of equipment, shall be in accordance with the latest issue of the various, applicable standard specifications of the following recognized authorities:
 - 1. N.S.I. - American National Standards Institute
 - 2. S.T.M. - American Society for Testing Materials
 - 3. C.E.A. - Insulated Cable Engineers Association
 - 4. E.E.E. - Institute of Electrical and Electronics Engineers
 - 5. E.C. - National Electrical Code (NFPA 70)
 - 6. E.C.A. - National Electrical Contractors Association
 - 7. E.M.A. - National Electrical Manufacturer's Association
 - 8. F.P.A. - National Fire Protection Association
 - 9. L. - Underwriters Laboratories, Inc.
- B. Perform all work in a first class and workmanlike manner, in accordance with the latest accepted standards and practices for the Trades involved.
- C. All equipment of the same or similar systems shall be by the same manufacturer.

1.09 RECORD DRAWINGS

- A. Refer to Division 01 - General Requirements for procedures. All literature shall be furnished in accordance with requirements listed in Division 01.
- B. Contractor shall provide the following record drawings as part of the Project closeout document process:
 - 1. Contract Documents, specifications and submittals, indicating "As-Built" conditions and actual products selected for use.
 - 2. Product and Maintenance manuals for all equipment listed within this specification manual and in Contract Documents. Provide with parts lists as applicable.

1.10 SUBMITTALS

- A. Refer to Division 01 - General Requirements for procedures.
- B. Contractor shall provide submittals where items are referred to by symbolic designation on the drawings. All submittals shall bear the same designation (light fixtures, wiring devices, etc.). Refer to other sections of the electrical specifications for additional requirements.
- C. Engineer WILL NOT REVIEW:
 - 1. Submittals not specified.
 - 2. Submittals which do not indicate optional equipment being provided.
 - 3. Submittals not reviewed by Contractor; including Contractor stamp with signature comments.
 - 4. Submittals made after work is delivered to site and/or installed.
 - 5. Submittal resubmissions unless resubmission is required by Architect/Engineer.

1.11 MANUFACTURERS LISTED

- A. The listing of specific manufacturers does not imply acceptance of their products that do not meet the specified ratings, features and functions. Manufacturers listed are not relieved from meeting these specifications in their entirety.
- B. Products in compliance with the specification and manufactured by others not named will be considered only if pre-approved by the Engineer five (5) days prior to bid date.

1.12 USE OF EQUIPMENT

- A. The use of any equipment, or any part thereof for purposes other than testing even with the Owner's consent, shall not be construed to be an acceptance of the work on the part of the Owner, nor be construed to obligate the Owner in any way to accept improper work or defective materials.
- B. Do not use Owner's light fixtures for temporary lighting except as allowed and directed by the Owner.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 INSTALLATION OF EQUIPMENT

- A. Install all equipment in strict accordance with all directions and recommendations furnished by the manufacturer. Where such directions are in conflict with the drawings and specifications, report such conflicts to the Architect/Engineer for resolution.
- B. Equipment location shall be as close as practical to locations shown on the drawings.
- C. Working clearances shall not be less than specified in NFPA 70 (National Electric Code).

3.02 COORDINATION

- A. Install work to avoid interference with work of other trades including, but not limited to, architectural and mechanical trades. Remove and relocate any work that causes an interference at Contractor's expense. Disputes regarding the cause of an interference will be resolved by the Construction Manager or Architect/Engineer.

3.03 CUTTING, PATCHING AND DAMAGE TO OTHER WORK

- A. Refer to Division 01 - General Requirements and Division 02 - Existing Conditions.
- B. All cutting, patching and repair work shall be performed by the contractor through approved, qualified subcontractors. Contractor shall include full cost of same in bid.

3.04 EXCAVATION AND BACKFILLING

- A. Provide all excavation, trenching, tunneling, dewatering and backfilling required for the electrical work. Coordinate the work with other excavating and backfilling in the same area.
- B. Where conduit is installed less than 30" below the surface of pavement, provide concrete encasement, 4" minimum coverage, all around or as shown on the electrical drawings.
- C. Backfill all excavations inside building, under drives and parking areas with well-tamped granular material. Backfill all excavations under wall footings with lean mix concrete up to underside of footings and extend concrete within excavation a minimum of four (4) feet each side of footing. Granular backfill shall be placed in layers not more than 8 inches in thickness, 95 percent compaction throughout with approved compaction equipment. Tamp, roll as required. Excavated material shall not be used.
- D. Backfill outside building with granular material to a height 12 inches over top of pipe compacted to 95 percent compaction as specified above. Backfill remainder of excavation with unfrozen, excavated material in such a way to prevent settling. Tamp, roll as required.

3.05 EQUIPMENT FOUNDATION AND SUPPORTS

- A. Shall be as required or as shown on plans or specified.
- B. Provide concrete house keeping bases 4" above finished floor, with leveling channels, where noted, for floor-mounted equipment. Coordinate requirements with Division 03 - Concrete.
- C. For equipment suspended from ceilings or walls, furnish and install all inserts, rods, structural steel frames, brackets and platforms required.

3.06 EQUIPMENT CONNECTIONS

- A. Make connections to equipment, motors, lighting fixtures, and other items included in the work in accordance with the approved shop drawings and rough-in measurements furnished by the manufacturers of the particular equipment furnished. All additional connections not shown on the drawings, but called out by the equipment manufacturer's shop drawings shall be provided.

3.07 ACCESS DOORS AND PANELS

- A. Refer to Division 08 - Openings; Provide access doors in locations as required per N.E.C. Coordinate locations with architectural trades.

3.08 CLEANING

- A. Refer to Division 01 - General Requirements; All equipment shall be cleaned as frequently as necessary through the construction process and again prior to project completion.
- B. Final cleanup shall include, but not be limited to, washing of fixture lenses or louvers, switchboards, substations, motor control centers, panels, etc. Fixture reflectors and lenses or louvers shall be left with no water marks or cleaning streaks.

3.09 DELIVERY, STORAGE AND PROTECTION OF EQUIPMENT AND MATERIALS

- A. Refer to Division 01 - General Requirements; All equipment and materials shall be delivered, stored and secured per manufacturer's recommendations.
- B. On-site storage shall be coordinated with Construction Manager and be performed in a manner as to avoid damage, deterioration and loss.

3.10 DRAWINGS AND MEASUREMENTS

- A. Electrical drawings are not intended to be scaled for rough-in measurements nor to serve as submittals. Field measurements necessary for ordering materials and fitting the installation to the building construction and arrangement shall be taken by the Contractor.

**SECTION 260505
SELECTIVE DEMOLITION FOR ELECTRICAL**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Electrical demolition and extension of existing electrical work.

1.02 RELATED REQUIREMENTS

- A. Division 01 - General Requirements: Project administrative and procedural requirements
- B. Division 02 - Existing Conditions: Demolition, cleaning and disposal requirements.
- C. Section 26 0005 - Basic Electrical Requirements.

PART 2 PRODUCTS

2.01 MATERIALS AND EQUIPMENT

- A. Materials and equipment for patching and extending work: As specified in individual sections.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that abandoned wiring and equipment serve only abandoned facilities.
- B. Demolition drawings are based on casual field observation and existing record documents.
- C. Beginning of demolition means installer accepts existing conditions.

3.02 PREPARATION

- A. Disconnect electrical systems in walls, floors, and ceilings to be removed.
- B. Coordinate utility service outages with utility company.
- C. 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.
- D. Existing Electrical Service: Maintain existing system in service until new system is complete and ready for service. Disable system only to make switchovers and connections. Minimize outage duration.
 - 1. Obtain permission from Owner at least 24 hours before partially or completely disabling system.
 - 2. Make temporary connections to maintain service in areas adjacent to work area.
- E. Existing Fire Alarm System: Maintain existing system in service until new system is accepted. Disable system only to make switchovers and connections. Minimize outage duration.
 - 1. Notify Owner before partially or completely disabling system.
 - 2. Notify local fire service.
 - 3. Make notifications at least 24 hours in advance.
 - 4. Make temporary connections to maintain service in areas adjacent to work area.

3.03 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK

- A. Perform work for removal and disposal of equipment and materials containing toxic substances regulated under the Federal Toxic Substances Control Act (TSCA) in accordance with applicable federal, state, and local regulations. Applicable equipment and materials include, but are not limited to:
 - 1. PCB-containing electrical equipment, including transformers, capacitors, and switches.
 - 2. PCB- and DEHP-containing lighting ballasts.
 - 3. Mercury-containing lamps and tubes, including fluorescent lamps, high intensity discharge (HID), arc lamps, ultra-violet, high pressure sodium, mercury vapor, ignitron tubes, neon,

and incandescent.

- B. Remove, relocate, and extend existing installations to accommodate new construction.
- C. Remove abandoned wiring to source of supply.
- D. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces.
- E. Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit servicing them is abandoned and removed. Provide blank cover for abandoned outlets that are not removed.
- F. Disconnect and remove abandoned panelboards and distribution equipment.
- G. Disconnect and remove abandoned luminaires. Remove brackets, stems, hangers, and other accessories.
- H. Repair adjacent construction and finishes damaged during demolition and extension work.
- I. Maintain access to existing electrical installations that remain active. Modify installation or provide access panel as appropriate.

3.04 CLEANING AND REPAIR

- A. See Division 01 - General Requirements.
- B. Clean and repair existing materials and equipment that remain or that are to be reused.
- C. Panelboards: Clean exposed surfaces and check tightness of electrical connections. Replace damaged circuit breakers and provide closure plates for vacant positions. Provide typed circuit directory showing revised circuiting arrangement.
- D. Luminaires: Remove existing luminaires for cleaning. Use mild detergent to clean all exterior and interior surfaces; rinse with clean water and wipe dry. Replace lamps, ballasts and broken electrical parts.

SECTION 260519
VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Single conductor building wire.
- B. Metal-clad cable.
- C. Wiring connectors.
- D. Electrical tape.
- E. Heat shrink tubing.
- F. Oxide inhibiting compound.
- G. Wire pulling lubricant.
- H. Cable ties.
- I. Firestop sleeves.

1.02 RELATED REQUIREMENTS

- A. Division 01 - General Requirements: Project administrative and procedural requirements.
- B. Division 02 - Existing Conditions: Demolition, cleaning and disposal requirements, cutting and patching requirements, and repairs.
- C. Section 07 8400 - Firestopping.
- D. Section 26 0005 - Basic Electrical Requirements.
- E. Section 26 0505 - Selective Demolition for Electrical: Disconnection, removal, and/or extension of existing electrical conductors and cables.
- F. Section 26 0526 - Grounding and Bonding for Electrical Systems: Additional requirements for grounding conductors and grounding connectors.
- G. Section 26 0536 - Cable Trays for Electrical Systems: Additional installation requirements for cables installed in cable tray systems.
- H. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.
- I. Section 28 4600 - Fire Detection and Alarm: Fire alarm system conductors and cables.
- J. Division 31 - Earthwork: Excavating, bedding, and backfilling.

1.03 REFERENCE STANDARDS

- A. ASTM B3 - Standard Specification for Soft or Annealed Copper Wire 2013 (Reapproved 2018).
- B. ASTM B8 - Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft 2011 (Reapproved 2017).
- C. ASTM B33 - Standard Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes 2010, with Editorial Revision (2020).
- D. ASTM B787/B787M - Standard Specification for 19 Wire Combination Unilay-Stranded Copper Conductors for Subsequent Insulation 2004 (Reapproved 2020).
- E. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- F. NECA 120 - Standard for Installing Armored Cable (AC) and Metal-Clad Cable (MC) 2012.
- G. NEMA WC 70 - Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy 2009.

- H. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems 2017.
- I. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- J. UL 44 - Thermoset-Insulated Wires and Cables Current Edition, Including All Revisions.
- K. UL 83 - Thermoplastic-Insulated Wires and Cables Current Edition, Including All Revisions.
- L. UL 486A-486B - Wire Connectors Current Edition, Including All Revisions.
- M. UL 486C - Splicing Wire Connectors Current Edition, Including All Revisions.
- N. UL 486D - Sealed Wire Connector Systems Current Edition, Including All Revisions.
- O. UL 1569 - Metal-Clad Cables Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate sizes of raceways, boxes, and equipment enclosures installed under other sections with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
 - 2. Coordinate with electrical equipment installed under other sections to provide terminations suitable for use with the conductors to be installed.
 - 3. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

- A. Contractor shall provide submittals for equipment listed herein. Refer to Division 01 for submittal procedures.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 FIELD CONDITIONS

- A. Do not install or otherwise handle thermoplastic-insulated conductors at temperatures lower than 14 degrees F, unless otherwise permitted by manufacturer's instructions. When installation below this temperature is unavoidable, notify Architect and obtain direction before proceeding with work.

PART 2 PRODUCTS

2.01 CONDUCTOR AND CABLE APPLICATIONS

- A. Do not use conductors and cables for applications other than as permitted by NFPA 70 and product listing.
- B. Provide single conductor building wire installed in suitable raceway unless otherwise indicated, permitted, or required.
- C. Nonmetallic-sheathed cable is not permitted.
- D. Underground feeder and branch-circuit cable is not permitted.
- E. Service entrance cable is not permitted.
- F. Armored cable is not permitted.

- G. Metal-clad cable is permitted only as follows:
 - 1. Where not otherwise restricted, may be used:
 - a. Where concealed above accessible ceilings for final connections from junction boxes to luminaires.
 - 1) Maximum Length: 6 feet.
 - b. Where concealed in hollow stud walls, above accessible ceilings, and under raised floors for branch circuits up to 20 A.
- H. Manufactured wiring systems are not permitted.

2.02 CONDUCTOR AND CABLE GENERAL REQUIREMENTS

- A. Provide products that comply with requirements of NFPA 70.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, etc. as required for a complete operating system.
- D. Comply with NEMA WC 70.
- E. Thermoplastic-Insulated Conductors and Cables: Listed and labeled as complying with UL 83.
- F. Thermoset-Insulated Conductors and Cables: Listed and labeled as complying with UL 44.
- G. Conductor Material:
 - 1. Provide copper conductors only. Aluminum conductors are not acceptable for this project. Conductor sizes indicated are based on copper.
 - 2. Copper Conductors: Soft drawn annealed, 98 percent conductivity, uncoated copper conductors complying with ASTM B3, ASTM B8, or ASTM B787/B787M unless otherwise indicated.
 - 3. Tinned Copper Conductors: Comply with ASTM B33.
- H. Minimum Conductor Size:
 - 1. Branch Circuits: 12 AWG.
 - a. Exceptions:
 - 1) 20 A, 120 V circuits longer than 75 feet: 10 AWG, for voltage drop.
 - 2) 20 A, 120 V circuits longer than 150 feet: 8 AWG, for voltage drop.
 - 3) 20 A, 277 V circuits longer than 150 feet: 10 AWG, for voltage drop.
- I. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
- J. Conductor Color Coding:
 - 1. Color code conductors as indicated unless otherwise required by the authority having jurisdiction. Maintain consistent color coding throughout project.
 - 2. Color Coding Method: Integrally colored insulation.
 - 3. Color Code:
 - a. 480Y/277 V, 3 Phase, 4 Wire System:
 - 1) Phase A: Brown.
 - 2) Phase B: Orange.
 - 3) Phase C: Yellow.
 - 4) Neutral/Grounded: Gray.
 - b. 208Y/120 V, 3 Phase, 4 Wire System:
 - 1) Phase A: Black.
 - 2) Phase B: Red.
 - 3) Phase C: Blue.
 - 4) Neutral/Grounded: White.
 - c. Equipment Ground, All Systems: Green.

- d. For modifications or additions to existing wiring systems, comply with existing color code when existing code complies with NFPA 70 and is approved by the authority having jurisdiction.

2.03 SINGLE CONDUCTOR BUILDING WIRE

- A. Manufacturers:
 1. Copper Building Wire:
 - a. Cerro Wire LLC: www.cerrowire.com.
 - b. Encore Wire Corporation: www.encorewire.com.
 - c. General Cable Technologies Corporation: www.generalcable.com.
 - d. Southwire Company: www.southwire.com.
- B. Description: Single conductor insulated wire.
- C. Conductor Stranding:
 1. Feeders and Branch Circuits:
 - a. Size 10 AWG and Smaller: Stranded.
 - b. Size 8 AWG and Larger: Stranded.
- D. Insulation Voltage Rating: 600 V.
- E. Insulation:
 1. Copper Building Wire: Type THHN/THWN or THHN/THWN-2, except as indicated below.

2.04 METAL-CLAD CABLE

- A. Manufacturers:
 1. AFC Cable Systems Inc: www.afcweb.com/#sle.
 2. Encore Wire Corporation: www.encorewire.com/#sle.
 3. Southwire Company: www.southwire.com/#sle.
- B. Description: NFPA 70, Type MC cable listed and labeled as complying with UL 1569, and listed for use in classified firestop systems to be used.
- C. Conductor Stranding:
 1. Size 10 AWG and Smaller: Stranded.
 2. Size 8 AWG and Larger: Stranded.
- D. Insulation Voltage Rating: 600 V.
- E. Insulation: Type THHN, THHN/THWN, or THHN/THWN-2.
- F. Provide oversized neutral conductors where indicated or required.
- G. Grounding: Full-size integral equipment grounding conductor.
- H. Armor: Steel, interlocked tape.

2.05 WIRING CONNECTORS

- A. Description: Wiring connectors appropriate for the application, suitable for use with the conductors to be connected, and listed as complying with UL 486A-486B or UL 486C as applicable.
- B. Connectors for Grounding and Bonding: Comply with Section 26 0526.
- C. Wiring Connectors for Splices and Taps:
 1. Copper Conductors Size 8 AWG and Smaller: Use twist-on insulated spring connectors.
 2. Copper Conductors Size 6 AWG and Larger: Use mechanical connectors or compression connectors.
- D. Wiring Connectors for Terminations:
 1. Provide terminal lugs for connecting conductors to equipment furnished with terminations designed for terminal lugs.

2. Provide compression adapters for connecting conductors to equipment furnished with mechanical lugs when only compression connectors are specified.
3. Where over-sized conductors are larger than the equipment terminations can accommodate, provide connectors suitable for reducing to appropriate size, but not less than required for the rating of the overcurrent protective device.
4. Copper Conductors Size 8 AWG and Larger: Use mechanical connectors or compression connectors where connectors are required.
- E. Do not use insulation-piercing or insulation-displacement connectors designed for use with conductors without stripping insulation.
- F. Do not use push-in wire connectors as a substitute for twist-on insulated spring connectors.
- G. Twist-on Insulated Spring Connectors: Rated 600 V, 221 degrees F for standard applications and 302 degrees F for high temperature applications; pre-filled with sealant and listed as complying with UL 486D for damp and wet locations.
- H. Mechanical Connectors: Provide bolted type or set-screw type.
- I. Compression Connectors: Provide circumferential type or hex type crimp configuration.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that interior of building has been protected from weather.
- B. Verify that work likely to damage wire and cable has been completed.
- C. Verify that raceways, boxes, and equipment enclosures are installed and are properly sized to accommodate conductors and cables in accordance with NFPA 70.
- D. Verify that field measurements are as indicated.
- E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

- A. Clean raceways thoroughly to remove foreign materials before installing conductors and cables.

3.03 INSTALLATION

- A. Circuiting Requirements:
 1. Unless dimensioned, circuit routing indicated is diagrammatic.
 2. When circuit destination is indicated without specific routing, determine exact routing required.
 3. Arrange circuiting to minimize splices.
 4. Include circuit lengths required to install connected devices within 10 ft of location indicated.
 5. Maintain separation of Class 1, Class 2, and Class 3 remote-control, signaling, and power-limited circuits in accordance with NFPA 70.
 6. Maintain separation of wiring for emergency systems in accordance with NFPA 70.
 7. Circuiting Adjustments: Unless otherwise indicated, when branch circuits are indicated as separate, combining them together in a single raceway is not permitted.
 8. Common Neutrals: Unless otherwise indicated, sharing of neutral/grounded conductors among up to three single phase branch circuits of different phases installed in the same raceway is not permitted. Provide dedicated neutral/grounded conductor for each individual branch circuit.
 9. Provide oversized neutral/grounded conductors where indicated and as specified below.
 - a. Provide 200 percent rated neutral for feeders fed from K-rated transformers.
 - b. Provide 200 percent rated neutral for feeders serving panelboards with 200 percent rated neutral bus.

- B. Install products in accordance with manufacturer's instructions.
- C. Perform work in accordance with NECA 1 (general workmanship).
- D. Install metal-clad cable (Type MC) in accordance with NECA 120.
- E. Installation in Raceway:
 - 1. Tape ends of conductors and cables to prevent infiltration of moisture and other contaminants.
 - 2. Pull all conductors and cables together into raceway at same time.
 - 3. Do not damage conductors and cables or exceed manufacturer's recommended maximum pulling tension and sidewall pressure.
 - 4. Use suitable wire pulling lubricant where necessary, except when lubricant is not recommended by the manufacturer.
- F. Paralleled Conductors: Install conductors of the same length and terminate in the same manner.
- G. Secure and support conductors and cables in accordance with NFPA 70 using suitable supports and methods approved by the authority having jurisdiction. Provide independent support from building structure. Do not provide support from raceways, piping, ductwork, or other systems.
- H. Terminate cables using suitable fittings.
 - 1. Metal-Clad Cable (Type MC):
 - a. Use listed fittings.
 - b. Cut cable armor only using specialized tools to prevent damaging conductors or insulation. Do not use hacksaw or wire cutters to cut armor.
- I. Install conductors with a minimum of 12 inches of slack at each outlet.
- J. Where conductors are installed in enclosures for future termination by others, provide a minimum of 5 feet of slack.
- K. Neatly train and bundle conductors inside boxes, wireways, panelboards and other equipment enclosures.
- L. Group or otherwise identify neutral/grounded conductors with associated ungrounded conductors inside enclosures in accordance with NFPA 70.
- M. Make wiring connections using specified wiring connectors.
 - 1. Make splices and taps only in accessible boxes. Do not pull splices into raceways or make splices in conduit bodies or wiring gutters.
 - 2. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors.
 - 3. Do not remove conductor strands to facilitate insertion into connector.
 - 4. Clean contact surfaces on conductors and connectors to suitable remove corrosion, oxides, and other contaminates. Do not use wire brush on plated connector surfaces.
 - 5. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
 - 6. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.
- N. Insulate splices and taps that are made with uninsulated connectors using methods suitable for the application, with insulation and mechanical strength at least equivalent to unspliced conductors.
- O. Insulate ends of spare conductors using vinyl insulating electrical tape.
- P. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Division 07.

- Q. Unless specifically indicated to be excluded, provide final connections to all equipment and devices, including those furnished by others, as required for a complete operating system.

3.04 FIELD QUALITY CONTROL

- A. Inspect and test in accordance with NETA ATS, except Section 4.
- B. Perform inspections and tests listed in NETA ATS, Section 7.3.2. The insulation resistance test is required for all conductors. The resistance test for parallel conductors listed as optional is not required.
1. Disconnect surge protective devices (SPDs) prior to performing any high potential testing. Replace SPDs damaged by performing high potential testing with SPDs connected.
- C. Correct deficiencies and replace damaged or defective conductors and cables.

**SECTION 260526
GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Grounding and bonding requirements.
- B. Conductors for grounding and bonding.
- C. Connectors for grounding and bonding.
- D. Ground bars.
- E. Ground rod electrodes.

1.02 RELATED REQUIREMENTS

- A. Division 01 - General Requirements: Project administrative and procedural requirements
- B. Division 02 - Existing Conditions: Demolition, cleaning and disposal requirements, cutting and patching requirements, repairs.
- C. Section 26 0005 - Basic Electrical Requirements
- D. Section 26 0519 - Low-Voltage Electrical Power Conductors and Cables: Additional requirements for conductors for grounding and bonding, including conductor color coding.
- E. Section 26 0536 - Cable Trays for Electrical Systems: Additional grounding and bonding requirements for cable tray systems.
- F. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.
- G. Section 26 5600 - Exterior Lighting: Additional grounding and bonding requirements for pole-mounted luminaires.
- H. Division 31 - Earthwork: Excavating, trenching and fill.

1.03 REFERENCE STANDARDS

- A. IEEE 81 - IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System 2012.
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- C. NEMA GR 1 - Grounding Rod Electrodes and Grounding Rod Electrode Couplings 2017.
- D. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems 2017.
- E. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- F. UL 467 - Grounding and Bonding Equipment Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Verify exact locations of underground metal water service pipe entrances to building.
 - 2. Coordinate the work with other trades to provide steel reinforcement complying with specified requirements for concrete-encased electrode.
 - 3. Notify Strategic Energy Solutions, Inc. of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- B. Sequencing:
 - 1. Do not install ground rod electrodes until final backfill and compaction is complete.

1.05 SUBMITTALS

- A. Contractor shall provide submittals for equipment listed herein. Refer to Division 01 for submittal procedures.
- B. Project Record Documents: Record actual locations of grounding electrode system components and connections.

PART 2 PRODUCTS

2.01 GROUNDING AND BONDING REQUIREMENTS

- A. Existing Work: Where existing grounding and bonding system components are indicated to be reused, they may be reused only where they are free from corrosion, integrity and continuity are verified, and where acceptable to the authority having jurisdiction.
- B. Do not use products for applications other than as permitted by NFPA 70 and product listing.
- C. Unless specifically indicated to be excluded, provide all required components, conductors, connectors, conduit, boxes, fittings, supports, accessories, etc. as necessary for a complete grounding and bonding system.
- D. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
- E. Grounding System Resistance:
 - 1. Achieve specified grounding system resistance under normally dry conditions unless otherwise approved by Architect. Precipitation within the previous 48 hours does not constitute normally dry conditions.
 - 2. Grounding Electrode System: Not greater than 5 ohms to ground, when tested according to IEEE 81 using "fall-of-potential" method.
 - 3. Between Grounding Electrode System and Major Electrical Equipment Frames, System Neutral, and Derived Neutral Points: Not greater than 0.5 ohms, when tested using "point-to-point" methods.
- F. Grounding Electrode System:
 - 1. Provide connection to required and supplemental grounding electrodes indicated to form grounding electrode system.
 - a. Provide continuous grounding electrode conductors without splice or joint.
 - b. Install grounding electrode conductors in raceway where exposed to physical damage. Bond grounding electrode conductor to metallic raceways at each end with bonding jumper.
 - 2. Metal Underground Water Pipe(s):
 - a. Provide connection to underground metal domestic and fire protection (where present) water service pipe(s) that are in direct contact with earth for at least 10 feet at an accessible location not more than 5 feet from the point of entrance to the building.
 - b. Provide bonding jumper(s) around insulating joints/pipes as required to make pipe electrically continuous.
 - c. Provide bonding jumper around water meter of sufficient length to permit removal of meter without disconnecting jumper.
 - 3. Concrete-Encased Electrode:
 - a. Provide connection to concrete-encased electrode consisting of not less than 20 feet of either steel reinforcing bars or bare copper conductor not smaller than 4 AWG embedded within concrete foundation or footing that is in direct contact with earth in accordance with NFPA 70.
 - 4. Ground Ring:
 - a. Provide a ground ring encircling the building or structure consisting of bare copper conductor not less than 2 AWG in direct contact with earth, installed at a depth of not less than 30 inches.

- b. Where location is not indicated, locate ground ring conductor at least 24 inches outside building perimeter foundation.
- c. Provide ground enhancement material around conductor.
- d. Provide connection from ground ring conductor to:
 - 1) Perimeter columns of metal building frame.
 - 2) Ground rod electrodes located as indicated.
5. Ground Rod Electrode(s):
 - a. Provide three electrodes in an equilateral triangle configuration unless otherwise indicated or required.
 - b. Space electrodes not less than 10 feet from each other and any other ground electrode.
 - c. Where location is not indicated, locate electrode(s) at least 5 feet outside building perimeter foundation as near as possible to electrical service entrance; where possible, locate in softscape (uncovered) area.
6. Provide additional ground electrode(s) as required to achieve specified grounding electrode system resistance.
7. Ground Bar: Provide ground bar, separate from service equipment enclosure, for common connection point of grounding electrode system bonding jumpers as permitted in NFPA 70. Connect grounding electrode conductor provided for service-supplied system grounding to this ground bar.
 - a. Ground Bar Size: 1/4 by 2 by 12 inches unless otherwise indicated or required.
 - b. Where ground bar location is not indicated, locate in accessible location as near as possible to service disconnect enclosure.
 - c. Ground Bar Mounting Height: 18 inches above finished floor unless otherwise indicated.
- G. Bonding and Equipment Grounding:
 1. Provide bonding for equipment grounding conductors, equipment ground busses, metallic equipment enclosures, metallic raceways and boxes, device grounding terminals, and other normally non-current-carrying conductive materials enclosing electrical conductors/equipment or likely to become energized as indicated and in accordance with NFPA 70.
 2. Provide insulated equipment grounding conductor in each feeder and branch circuit raceway. Do not use raceways as sole equipment grounding conductor.
 3. Where circuit conductor sizes are increased for voltage drop, increase size of equipment grounding conductor proportionally in accordance with NFPA 70.
 4. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
 5. Terminate branch circuit equipment grounding conductors on solidly bonded equipment ground bus only. Do not terminate on neutral (grounded) or isolated/insulated ground bus.
 6. Provide bonding jumper across expansion or expansion/deflection fittings provided to accommodate conduit movement.
- H. Cable Tray Systems: Also comply with Section 26 0536.
- I. Pole-Mounted Luminaires: Also comply with Section 26 5600.

2.02 GROUNDING AND BONDING COMPONENTS

- A. General Requirements:
 1. Provide products listed, classified, and labeled as suitable for the purpose intended.
 2. Provide products listed and labeled as complying with UL 467 where applicable.
- B. Conductors for Grounding and Bonding, in Addition to Requirements of Section 26 0526:
 1. Use insulated copper conductors unless otherwise indicated.
 - a. Exceptions:

- 1) Use bare copper conductors where installed underground in direct contact with earth.
 - 2) Use bare copper conductors where directly encased in concrete (not in raceway).
- C. Connectors for Grounding and Bonding:
1. Description: Connectors appropriate for the application and suitable for the conductors and items to be connected; listed and labeled as complying with UL 467.
 2. Unless otherwise indicated, use exothermic welded connections for underground, concealed and other inaccessible connections.
 3. Unless otherwise indicated, use mechanical connectors, compression connectors, or exothermic welded connections for accessible connections.
 4. Manufacturers - Mechanical and Compression Connectors:
 - a. Advanced Lightning Technology (ALT): www.altfab.com
 - b. Burndy LLC: www.burndy.com
 - c. Harger Lightning & Grounding: www.harger.com
 - d. Thomas & Betts Corporation: www.tnb.com
 5. Manufacturers - Exothermic Welded Connections:
 - a. Burndy LLC: www.burndy.com
 - b. Cadweld, a brand of Erico International Corporation: www.erico.com
 - c. thermOweld, subsidiary of Continental Industries; division of Burndy LLC: www.thermoweld.com
- D. Ground Bars:
1. Description: Copper rectangular ground bars with mounting brackets and insulators.
 2. Size: As indicated.
 3. Holes for Connections: As indicated or as required for connections to be made.
 4. Manufacturers:
 - a. Advanced Lightning Technology (ALT): www.altfab.com
 - b. Erico International Corporation: www.erico.com
 - c. Harger Lightning & Grounding: www.harger.com
 - d. thermOweld, subsidiary of Continental Industries; division of Burndy LLC: www.thermoweld.com
- E. Ground Rod Electrodes:
1. Comply with NEMA GR 1.
 2. Material: Copper-bonded (copper-clad) steel.
 3. Size: 3/4 inch diameter by 10 feet length, unless otherwise indicated.
 4. Where rod lengths of greater than 10 feet are indicated or otherwise required, sectionalized ground rods may be used.
 5. Manufacturers:
 - a. Advanced Lightning Technology (ALT): www.altfab.com/#sle.
 - b. Erico International Corporation: www.erico.com/#sle.
 - c. Galvan Industries, Inc: www.galvanelectrical.com/#sle.
 - d. Harger Lightning & Grounding: www.harger.com/#sle.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that work likely to damage grounding and bonding system components has been completed.
- B. Verify that field measurements are as indicated.
- C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Ground Rod Electrodes: Unless otherwise indicated, install ground rod electrodes vertically. Where encountered rock prohibits vertical installation, install at 45 degree angle or bury horizontally in trench at least 30 inches (750 mm) deep in accordance with NFPA 70 or provide ground plates.
- D. Make grounding and bonding connections using specified connectors.
 - 1. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors. Do not remove conductor strands to facilitate insertion into connector.
 - 2. Remove nonconductive paint, enamel, or similar coating at threads, contact points, and contact surfaces.
 - 3. Exothermic Welds: Make connections using molds and weld material suitable for the items to be connected in accordance with manufacturer's recommendations.
 - 4. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
 - 5. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.
- E. Identify grounding and bonding system components in accordance with Section 26 0553.

3.03 FIELD QUALITY CONTROL

- A. Inspect and test in accordance with NETA ATS except Section 4.
- B. Perform inspections and tests listed in NETA ATS, Section 7.13.
- C. Perform ground electrode resistance tests under normally dry conditions. Precipitation within the previous 48 hours does not constitute normally dry conditions.
- D. Investigate and correct deficiencies where measured ground resistances do not comply with specified requirements.

**SECTION 260529
HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Support and attachment requirements and components for equipment, conduit, cable, boxes, and other electrical work.

1.02 RELATED REQUIREMENTS

- A. Division 01 - General Requirements: Project administrative and procedural requirements
- B. Division 02 - Existing Conditions: Demolition, cleaning and disposal requirements, and cutting and patching requirements.
- C. Division 03 - Concrete: Concrete equipment pads.
- D. Section 03 3000 - Cast-in-Place Concrete: Concrete equipment pads.
- E. Section 26 0005 - Basic Electrical Requirements
- F. Section 26 0533.13 - Conduit for Electrical Systems: Additional support and attachment requirements for conduits.
- G. Section 26 0536 - Cable Trays for Electrical Systems: Additional support and attachment requirements for cable tray.
- H. Section 26 0533.16 - Boxes for Electrical Systems: Additional support and attachment requirements for boxes.
- I. Section 26 5100 - Interior Lighting: Additional support and attachment requirements for interior luminaires.
- J. Section 26 5600 - Exterior Lighting: Additional support and attachment requirements for exterior luminaires.

1.03 REFERENCE STANDARDS

- A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2017.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2016a.
- C. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel 2019.
- D. MFMA-4 - Metal Framing Standards Publication 2004.
- E. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- F. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- G. UL 5B - Strut-Type Channel Raceways and Fittings Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate sizes and arrangement of supports and bases with the actual equipment and components to be installed.
 - 2. Coordinate the work with other trades to provide additional framing and materials required for installation.
 - 3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.

4. Coordinate the arrangement of supports with ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
 5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- B. Sequencing:
1. Do not install products on or provide attachment to concrete surfaces until concrete has fully cured in accordance with Division 03.

1.05 QUALITY ASSURANCE

- A. Comply with NFPA 70.
- B. Comply with applicable building code.

PART 2 PRODUCTS

2.01 SUPPORT AND ATTACHMENT COMPONENTS

- A. General Requirements:
1. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of electrical work.
 2. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.
 3. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supported. Include consideration for vibration, equipment operation, and shock loads where applicable.
 4. Do not use products for applications other than as permitted by NFPA 70 and product listing.
 5. Steel Components: Use corrosion resistant materials suitable for the environment where installed.
 - a. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
 - b. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.
- B. Conduit and Cable Supports: Straps, clamps, etc. suitable for the conduit or cable to be supported.
1. Conduit Straps: One-hole or two-hole type; steel or malleable iron.
 2. Conduit Clamps: Bolted type unless otherwise indicated.
 3. Manufacturers:
 - a. Cooper Crouse-Hinds, a division of Eaton Corporation: www.cooperindustries.com
 - b. Erico International Corporation: www.erico.com
 - c. HoldRite, a brand of Reliance Worldwide Corporation: www.holdrite.com
 - d. O-Z/Gedney, a brand of Emerson Electric Co: www.emerson.com
 - e. Thomas & Betts Corporation: www.tnb.com
- C. Outlet Box Supports: Hangers, brackets, etc. suitable for the boxes to be supported.
1. Manufacturers:
 - a. Cooper Crouse-Hinds, a division of Eaton Corporation: www.cooperindustries.com/#sle.
 - b. Erico International Corporation: www.erico.com/#sle.
 - c. HoldRite, a brand of Reliance Worldwide Corporation: www.holdrite.com/#sle.
 - d. O-Z/Gedney, a brand of Emerson Electric Co: www.emerson.com/#sle.
 - e. Thomas & Betts Corporation: www.tnb.com/#sle.
- D. Metal Channel (Strut) Framing Systems: Factory-fabricated continuous-slot metal channel (strut) and associated fittings, accessories, and hardware required for field-assembly of

supports.

1. Comply with MFMA-4.
 2. Channel (Strut) Used as Raceway (only where specifically indicated): Listed and labeled as complying with UL 5B.
 3. Manufacturers:
 - a. Cooper B-Line, a division of Eaton Corporation: www.cooperindustries.com
 - b. Thomas & Betts Corporation: www.tnb.com
 - c. Unistrut, a brand of Atkore International Inc: www.unistrut.com
- E. Hanger Rods: Threaded zinc-plated steel unless otherwise indicated.
1. Minimum Size, Unless Otherwise Indicated or Required:
 - a. Equipment Supports: 1/2 inch diameter.
 - b. Single Conduit up to 1 inch (27 mm) trade size: 1/4 inch diameter.
 - c. Single Conduit larger than 1 inch (27 mm) trade size: 3/8 inch diameter.
 - d. Trapeze Support for Multiple Conduits: 3/8 inch diameter.
 - e. Outlet Boxes: 1/4 inch diameter.
 - f. Luminaires: 1/4 inch diameter.
- F. Non-Penetrating Rooftop Supports for Low-Slope Roofs: Steel pedestals with thermoplastic or rubber bases that rest on top of roofing membrane, not requiring any attachment to the roof structure and not penetrating the roofing assembly, with support fixtures as specified.
1. Base Sizes: As required to distribute load sufficiently to prevent indentation of roofing assembly.
 2. Attachment/Support Fixtures: As recommended by manufacturer, same type as indicated for equivalent indoor hangers and supports.
 3. Mounting Height: Provide minimum clearance of 6 inches under supported component to top of roofing.
 4. Manufacturers:
 - a. Cooper B-Line, a division of Eaton Corporation: www.cooperindustries.com
 - b. Erico International Corporation: www.erico.com
 - c. PHP Systems/Design: www.phpsd.com
 - d. Unistrut, a brand of Atkore International Inc: www.unistrut.com
- G. Anchors and Fasteners:
1. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
- D. Unless specifically indicated or approved by Architect, do not provide support from suspended ceiling support system or ceiling grid.
- E. Unless specifically indicated or approved by Architect, do not provide support from roof deck.
- F. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.
- G. Equipment Support and Attachment:
 1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.

2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
 3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
 4. Unless otherwise indicated, mount floor-mounted equipment on properly sized 4 inch high concrete pad constructed in accordance with Division 03.
 5. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.
- H. Conduit Support and Attachment: Also comply with Section 26 0533.13.
- I. Cable Tray Support and Attachment: Also comply with Section 26 0536.
- J. Box Support and Attachment: Also comply with Section 26 0533.16.
- K. Secure fasteners according to manufacturer's recommended torque settings.
- L. Remove temporary supports.

3.02 FIELD QUALITY CONTROL

- A. See Division 01 - General Requirements for additional requirements.
- B. Inspect support and attachment components for damage and defects.
- C. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.
- D. Correct deficiencies and replace damaged or defective support and attachment components.

**SECTION 260533.13
CONDUIT FOR ELECTRICAL SYSTEMS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Galvanized steel rigid metal conduit (RMC).
- B. Aluminum rigid metal conduit (RMC).
- C. Flexible metal conduit (FMC).
- D. Electrical metallic tubing (EMT).
- E. Rigid polyvinyl chloride (PVC) conduit.
- F. Conduit fittings.
- G. Accessories.

1.02 RELATED REQUIREMENTS

- A. Division 01 - General Requirements: Project administrative and procedural requirements.
- B. Division 02 - Existing Conditions: Demolition, cleaning and disposal requirements, cutting and patching requirements, and repairs.
- C. Division 07 - Thermal and Moisture Protection: Firestopping.
- D. Section 07 8400 - Firestopping.
- E. Section 26 0005 - Basic Electrical Requirements
- F. Section 26 0519 - Low-Voltage Electrical Power Conductors and Cables.
- G. Section 26 0526 - Grounding and Bonding for Electrical Systems.
- H. Section 26 0529 - Hangers and Supports for Electrical Systems.
- I. Section 26 0533.16 - Boxes for Electrical Systems.
- J. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.
- K. Section 28 4600 - Fire Detection and Alarm: Fire alarm wiring in conduit.
- L. Division 31 - Earthwork: Excavating, trenching and fill.
- M. Section 31 2316.13 - Trenching: Excavating, bedding, and backfilling.

1.03 REFERENCE STANDARDS

- A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC) 2015.
- B. ANSI C80.3 - American National Standard for Electrical Metallic Tubing -- Steel (EMT-S) 2015.
- C. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- D. NECA 101 - Standard for Installing Steel Conduits (Rigid, IMC, EMT) 2013.
- E. NECA 102 - Standard for Installing Aluminum Rigid Metal Conduit 2004.
- F. NECA 111 - Standard for Installing Nonmetallic Raceways (RNC, ENT, LFNC) 2017.
- G. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable 2014.
- H. NEMA RN 1 - Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit 2018.
- I. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Conduit 2020.

- J. NEMA TC 3 - Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing 2016.
- K. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- L. UL 1 - Flexible Metal Conduit Current Edition, Including All Revisions.
- M. UL 6 - Electrical Rigid Metal Conduit-Steel Current Edition, Including All Revisions.
- N. UL 514B - Conduit, Tubing, and Cable Fittings Current Edition, Including All Revisions.
- O. UL 651 - Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings Current Edition, Including All Revisions.
- P. UL 797 - Electrical Metallic Tubing-Steel Current Edition, Including All Revisions.

PART 2 PRODUCTS

2.01 CONDUIT APPLICATIONS

- A. Do not use conduit and associated fittings for applications other than as permitted by NFPA 70 and product listing.
- B. Unless otherwise indicated and where not otherwise restricted, use the conduit types indicated for the specified applications. Where more than one listed application applies, comply with the most restrictive requirements. Where conduit type for a particular application is not specified, use galvanized steel rigid metal conduit.
- C. Underground:
 - 1. Under Slab on Grade: Use galvanized steel rigid metal conduit or rigid PVC conduit.
 - 2. Exterior, Direct-Buried: Use galvanized steel rigid metal conduit or rigid PVC conduit.
 - 3. Exterior, Embedded Within Concrete: Use galvanized steel rigid metal conduit or rigid PVC conduit.
 - 4. Where rigid polyvinyl (PVC) conduit is provided, transition to galvanized steel rigid metal conduit where emerging from underground.
 - 5. Where rigid polyvinyl (PVC) conduit larger than 2 inch (53 mm) trade size is provided, use galvanized steel rigid metal conduit elbows for bends.
- D. Embedded Within Concrete:
 - 1. Within Slab on Grade (within structural slabs only where approved by Structural Engineer): Use galvanized steel rigid metal conduit or rigid PVC conduit.
 - 2. Within Slab Above Ground (within structural slabs only where approved by Structural Engineer): Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), PVC-coated galvanized steel rigid metal conduit, or rigid PVC conduit.
- E. Concealed Within Masonry Walls: Use galvanized steel rigid metal conduit or electrical metallic tubing (EMT).
- F. Concealed Within Hollow Stud Walls: Use galvanized steel rigid metal conduit or electrical metallic tubing (EMT).
- G. Concealed Above Accessible Ceilings: Use galvanized steel rigid metal conduit or electrical metallic tubing (EMT).
- H. Interior, Damp or Wet Locations: Use galvanized steel rigid metal conduit.
- I. Exposed, Interior, Not Subject to Physical Damage: Use galvanized steel rigid metal conduit or electrical metallic tubing (EMT).
- J. Exposed, Interior, Subject to Physical Damage: Use galvanized steel rigid metal conduit or intermediate metal conduit (IMC).
- K. Exposed, Exterior: Use galvanized steel rigid metal conduit or PVC-coated galvanized steel rigid metal conduit.

- L. Concealed, Exterior, Not Embedded in Concrete or in Contact With Earth: Use galvanized steel rigid metal conduit.
- M. Connections to Luminaires Above Accessible Ceilings: Use flexible metal conduit.
 - 1. Maximum Length: 6 feet.
- N. Connections to Vibrating Equipment:
 - 1. Dry Locations: Use flexible metal conduit.
 - 2. Damp, Wet, or Corrosive Locations: Use liquidtight flexible metal conduit.
 - 3. Vibrating equipment includes, but is not limited to:
 - a. Transformers.
 - b. Motors.
- O. Fished in Existing Walls, Where Necessary: Use flexible metal conduit.

2.02 CONDUIT REQUIREMENTS

- A. Existing Work: Where existing conduits are indicated to be reused, they may be reused only where they comply with specified requirements, are free from corrosion, and integrity is verified by pulling a mandrel through them.
- B. Provide all conduit, fittings, supports, and accessories required for a complete raceway system.
- C. Provide products listed, classified, and labeled as suitable for the purpose intended.
- D. Minimum Conduit Size, Unless Otherwise Indicated:
 - 1. Branch Circuits: 3/4 inch (21 mm) trade size.
 - 2. Flexible Connections to Luminaires: 3/8 inch (12 mm) trade size.
 - 3. Underground, Interior: 1 inch (27 mm) trade size.
 - 4. Underground, Exterior: 1 inch (27 mm) trade size.
- E. Where conduit size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

2.03 GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

- A. Manufacturers:
 - 1. Allied Tube & Conduit: www.alliedeg.com
 - 2. Republic Conduit: www.republic-conduit.com
 - 3. Wheatland Tube, a Division of Zekelman Industries: www.wheatland.com
- B. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6.
- C. Fittings:
 - 1. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 - 2. Material: Use steel or malleable iron.
 - 3. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

2.04 FLEXIBLE METAL CONDUIT (FMC)

- A. Manufacturers:
 - 1. AFC Cable Systems, Inc: www.afcweb.com
 - 2. Electri-Flex Company: www.electriflex.com
 - 3. International Metal Hose: www.metalhose.com
- B. Description: NFPA 70, Type FMC standard wall steel flexible metal conduit listed and labeled as complying with UL 1, and listed for use in classified firestop systems to be used.
- C. Fittings:

1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
2. Material: Use steel or malleable iron.

2.05 ELECTRICAL METALLIC TUBING (EMT)

- A. Manufacturers:
 1. Allied Tube & Conduit: www.alliedeg.com
 2. Republic Conduit: www.republic-conduit.com
 3. Wheatland Tube, a Division of Zekelman Industries: www.wheatland.com
- B. Description: NFPA 70, Type EMT steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797.
- C. Fittings:
 1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 2. Material: Use steel or malleable iron.
 3. Connectors and Couplings: Use compression (gland) or set-screw type.
 - a. Do not use indenter type connectors and couplings.
 4. Damp or Wet Locations (where permitted): Use fittings listed for use in wet locations.
 5. Embedded Within Concrete (where permitted): Use fittings listed as concrete-tight. Fittings that require taping to be concrete-tight are acceptable.

2.06 RIGID POLYVINYL CHLORIDE (PVC) CONDUIT

- A. Manufacturers:
 1. Cantex Inc: www.cantexinc.com
 2. Carlon, a brand of Thomas & Betts Corporation: www.carlon.com
 3. JM Eagle: www.jmeagle.com
- B. Description: NFPA 70, Type PVC rigid polyvinyl chloride conduit complying with NEMA TC 2 and listed and labeled as complying with UL 651; Schedule 40 unless otherwise indicated, Schedule 80 where subject to physical damage; rated for use with conductors rated 90 degrees C.
- C. Fittings:
 1. Manufacturer: Same as manufacturer of conduit to be connected.
 2. Description: Fittings complying with NEMA TC 3 and listed and labeled as complying with UL 651; material to match conduit.

2.07 ACCESSORIES

- A. Conduit Joint Compound: Corrosion-resistant, electrically conductive; suitable for use with the conduit to be installed.
- B. Solvent Cement for PVC Conduit and Fittings: As recommended by manufacturer of conduit and fittings to be installed.
- C. Pull Strings: Use nylon cord with average breaking strength of not less than 200 pound-force.
- D. Sealing Compound for Sealing Fittings: Listed for use with the particular fittings to be installed.
- E. Modular Seals for Conduit Penetrations: Rated for minimum of 40 psig; Suitable for the conduits to be installed.
- F. Sealing Systems for Roof Penetrations: Premanufactured components and accessories as required to preserve integrity of roofing system and maintain roof warranty; suitable for conduits and roofing system to be installed; designed to accommodate existing penetrations where applicable.
- G. Firestop Sleeves: Listed; provide as required to preserve fire resistance rating of building elements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that mounting surfaces are ready to receive conduits.
- C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Install galvanized steel rigid metal conduit (RMC) in accordance with NECA 101.
- D. Install rigid polyvinyl chloride (PVC) conduit in accordance with NECA 111.
- E. Conduit Routing:
 1. Unless dimensioned, conduit routing indicated is diagrammatic.
 2. When conduit destination is indicated without specific routing, determine exact routing required.
 3. Conceal all conduits unless specifically indicated to be exposed.
 4. Conduits in the following areas may be exposed, unless otherwise indicated:
 - a. Electrical rooms.
 - b. Mechanical equipment rooms.
 5. Unless otherwise approved, do not route conduits exposed:
 - a. Across floors.
 - b. Across roofs.
 - c. Across top of parapet walls.
 - d. Across building exterior surfaces.
 6. Conduits installed underground or embedded in concrete may be routed in the shortest possible manner unless otherwise indicated. Route all other conduits parallel or perpendicular to building structure and surfaces, following surface contours where practical.
 7. Arrange conduit to maintain adequate headroom, clearances, and access.
 8. Arrange conduit to provide no more than the equivalent of four 90 degree bends between pull points.
 9. Arrange conduit to prevent moisture traps. Provide drain fittings at low points and at sealing fittings where moisture may collect.
 10. Group parallel conduits in the same area together on a common rack.
- F. Conduit Support:
 1. Secure and support conduits in accordance with NFPA 70 and Section 26 0529 using suitable supports and methods approved by the authority having jurisdiction.
 2. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
 3. Installation Above Suspended Ceilings: Do not provide support from ceiling support system. Do not provide support from ceiling grid or allow conduits to lay on ceiling tiles.
 4. Use conduit strap to support single surface-mounted conduit.
 - a. Use clamp back spacer with conduit strap for damp and wet locations to provide space between conduit and mounting surface.
 5. Use metal channel (strut) with accessory conduit clamps to support multiple parallel surface-mounted conduits.
 6. Use trapeze hangers assembled from threaded rods and metal channel (strut) with accessory conduit clamps to support multiple parallel suspended conduits.
 7. Use of wire for support of conduits is not permitted.

- G. Connections and Terminations:
1. Use approved zinc-rich paint or conduit joint compound on field-cut threads of galvanized steel conduits prior to making connections.
 2. Where two threaded conduits must be joined and neither can be rotated, use three-piece couplings or split couplings. Do not use running threads.
 3. Use suitable adapters where required to transition from one type of conduit to another.
 4. Terminate threaded conduits in boxes and enclosures using threaded hubs or double lock nuts for dry locations and raintight hubs for wet locations.
 5. Provide insulating bushings or insulated throats at all conduit terminations to protect conductors.
 6. Secure joints and connections to provide maximum mechanical strength and electrical continuity.
- H. Penetrations:
1. Do not penetrate or otherwise notch or cut structural members, including footings and grade beams, without approval of Structural Engineer.
 2. Make penetrations perpendicular to surfaces unless otherwise indicated.
 3. Provide sleeves for penetrations as indicated or as required to facilitate installation. Set sleeves flush with exposed surfaces unless otherwise indicated or required.
 4. Conceal bends for conduit risers emerging above ground.
 5. Seal interior of conduits entering the building from underground at first accessible point to prevent entry of moisture and gases.
 6. Where conduits penetrate waterproof membrane, seal as required to maintain integrity of membrane.
 7. Make penetrations for roof-mounted equipment within associated equipment openings and curbs where possible to minimize roofing system penetrations. Where penetrations are necessary, seal as indicated or as required to preserve integrity of roofing system and maintain roof warranty. Include proposed locations of penetrations and methods for sealing with submittals.
 8. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Division 07.
- I. Underground Installation:
1. Provide trenching and backfilling in accordance with Division 31.
- J. Embedment Within Structural Concrete Slabs (only where approved by Structural Engineer):
1. Secure conduits to prevent floating or movement during pouring of concrete.
- K. Concrete Encasement: Where conduits not otherwise embedded within concrete are indicated to be concrete-encased, provide concrete in accordance with Division 03 with minimum concrete cover of 2 inches on all sides unless otherwise indicated.
- L. Conduit Movement Provisions: Where conduits are subject to movement, provide expansion and expansion/deflection fittings to prevent damage to enclosed conductors or connected equipment. This includes, but is not limited to:
1. Where conduits cross structural joints intended for expansion, contraction, or deflection.
 2. Where calculated in accordance with NFPA 70 for rigid polyvinyl chloride (PVC) conduit installed above ground to compensate for thermal expansion and contraction.
 3. Where conduits are subject to earth movement by settlement or frost.
- M. Condensation Prevention: Where conduits cross barriers between areas of potential substantial temperature differential, provide sealing fitting or approved sealing compound at an accessible point near the penetration to prevent condensation. This includes, but is not limited to:
1. Where conduits pass from outdoors into conditioned interior spaces.
 2. Where conduits pass from unconditioned interior spaces into conditioned interior spaces.

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- N. Provide grounding and bonding in accordance with Section 26 0526.
- O. Identify conduits in accordance with Section 26 0553.

3.03 PROTECTION

- A. Immediately after installation of conduit, use suitable manufactured plugs to provide protection from entry of moisture and foreign material and do not remove until ready for installation of conductors.

SECTION 260533.16
BOXES FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Outlet and device boxes up to 100 cubic inches, including those used as junction and pull boxes.
- B. Cabinets and enclosures, including junction and pull boxes larger than 100 cubic inches.

1.02 RELATED REQUIREMENTS

- A. Division 01 - General Requirements: Project administrative and procedural requirements.
- B. Division 03 - Concrete: Concrete.
- C. Division 07 - Thermal and Moisture Protection: Firestopping.
- D. Division 08 - Openings: Access Doors.
- E. Section 08 3100 - Access Doors and Panels: Panels for maintaining access to concealed boxes.
- F. Section 26 0005 - Basic Electrical Requirements.
- G. Section 26 0526 - Grounding and Bonding for Electrical Systems.
- H. Section 26 0529 - Hangers and Supports for Electrical Systems.
- I. Section 26 0533.13 - Conduit for Electrical Systems:
 - 1. Conduit bodies and other fittings.
 - 2. Additional requirements for locating boxes to limit conduit length and/or number of bends between pulling points.
- J. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.
- K. Section 26 2726 - Wiring Devices:
 - 1. Wall plates.
- L. Section 26 2813 - Fuses: Spare fuse cabinets.

1.03 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- B. NECA 130 - Standard for Installing and Maintaining Wiring Devices 2010.
- C. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable 2014.
- D. NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports 2013.
- E. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2020.
- F. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- G. SCTE 77 - Specification for Underground Enclosure Integrity 2017.
- H. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations Current Edition, Including All Revisions.
- I. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations Current Edition, Including All Revisions.
- J. UL 508A - UL Standard for Safety Industrial Control Panels 2018.
- K. UL 514A - Metallic Outlet Boxes Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.
 2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
 3. Coordinate minimum sizes of boxes with the actual installed arrangement of conductors, clamps, support fittings, and devices, calculated according to NFPA 70.
 4. Coordinate minimum sizes of pull boxes with the actual installed arrangement of connected conduits, calculated according to NFPA 70.
 5. Coordinate the placement of boxes with millwork, furniture, devices, equipment, etc. installed under other sections or by others.
 6. Coordinate the work with other trades to preserve insulation integrity.
 7. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted boxes where indicated.
 8. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

- A. Contractor shall provide submittals for equipment listed herein. Refer to Division 01 for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for cabinets and enclosures, boxes for hazardous (classified) locations, floor boxes, and underground boxes/enclosures.
1. Underground Boxes/Enclosures: Include reports for load testing in accordance with SCTE 77 certified by a professional engineer or an independent testing agency upon request.
- C. Project Record Documents: Record actual locations for outlet and device boxes, pull boxes, cabinets and enclosures, floor boxes, and underground boxes/enclosures.
- D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
1. See Section 01 6000 - Product Requirements, for additional provisions.
 2. Keys for Lockable Enclosures: Two of each different key.

PART 2 PRODUCTS

2.01 BOXES

- A. General Requirements:
1. Do not use boxes and associated accessories for applications other than as permitted by NFPA 70 and product listing.
 2. Provide all boxes, fittings, supports, and accessories required for a complete raceway system and to accommodate devices and equipment to be installed.
 3. Provide products listed, classified, and labeled as suitable for the purpose intended.
 4. Where box size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
 5. Provide grounding terminals within boxes where equipment grounding conductors terminate.
- B. Outlet and Device Boxes Up to 100 cubic inches, Including Those Used as Junction and Pull Boxes:
1. Use sheet-steel boxes for dry locations unless otherwise indicated or required.
 2. Use cast iron boxes or cast aluminum boxes for damp or wet locations unless otherwise indicated or required; furnish with compatible weatherproof gasketed covers.

3. Use suitable concrete type boxes where flush-mounted in concrete.
 4. Use suitable masonry type boxes where flush-mounted in masonry walls.
 5. Use raised covers suitable for the type of wall construction and device configuration where required.
 6. Use shallow boxes where required by the type of wall construction.
 7. Do not use "through-wall" boxes designed for access from both sides of wall.
 8. Sheet-Steel Boxes: Comply with NEMA OS 1, and list and label as complying with UL 514A.
 9. Cast Metal Boxes: Comply with NEMA FB 1, and list and label as complying with UL 514A; furnish with threaded hubs.
 10. Boxes for Supporting Luminaires and Ceiling Fans: Listed as suitable for the type and weight of load to be supported; furnished with fixture stud to accommodate mounting of luminaire where required.
 11. Boxes for Ganged Devices: Use multigang boxes of single-piece construction. Do not use field-connected gangable boxes unless specifically indicated or permitted.
 12. Wall Plates: Comply with Section 26 2726.
 13. Manufacturers:
 - a. Cooper Crouse-Hinds, a division of Eaton Corporation: www.cooperindustries.com
 - b. Hubbell Incorporated; Bell Products: www.hubbell-rtb.com
 - c. Hubbell Incorporated; RACO Products: www.hubbell-rtb.com
 - d. O-Z/Gedney, a brand of Emerson Electric Co: www.emerson.com
 - e. Thomas & Betts Corporation: www.tnb.com
- C. Cabinets and Enclosures, Including Junction and Pull Boxes Larger Than 100 cubic inches:
1. Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E, or UL 508A.
 2. NEMA 250 Environment Type, Unless Otherwise Indicated:
 3. Junction and Pull Boxes Larger Than 100 cubic inches:
 - a. Provide screw-cover or hinged-cover enclosures unless otherwise indicated.
 - b. Boxes 6 square feet and Larger: Provide sectionalized screw-cover or hinged-cover enclosures.
 4. Cabinets and Hinged-Cover Enclosures, Other Than Junction and Pull Boxes:
 - a. Provide lockable hinged covers, all locks keyed alike unless otherwise indicated.
 - b. Back Panels: Painted steel, removable.
 - c. Terminal Blocks: Provide voltage/current ratings and terminal quantity suitable for purpose indicated, with 25 percent spare terminal capacity.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that mounting surfaces are ready to receive boxes.
- C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install boxes in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards where mounting heights are not indicated.
- C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- D. Provide separate boxes for emergency power and normal power systems.

- E. Unless otherwise indicated, provide separate boxes for line voltage and low voltage systems.
- F. Flush-mount boxes in finished areas unless specifically indicated to be surface-mounted.
- G. Unless otherwise indicated, boxes may be surface-mounted where exposed conduits are indicated or permitted.
- H. Box Locations:
 - 1. Locate boxes to be accessible. Provide access panels in accordance with Division 08 as required where approved by the Architect.
 - 2. Unless dimensioned, box locations indicated are approximate.
 - 3. Locate boxes as required for devices installed under other sections or by others.
 - 4. Locate boxes so that wall plates do not span different building finishes.
 - 5. Locate boxes so that wall plates do not cross masonry joints.
 - 6. Do not install flush-mounted boxes on opposite sides of walls back-to-back. Provide minimum 6 inches horizontal separation unless otherwise indicated.
 - 7. Fire Resistance Rated Walls: Install flush-mounted boxes such that the required fire resistance will not be reduced.
 - a. Do not install flush-mounted boxes on opposite sides of walls back-to-back; provide minimum 24 inches separation where wall is constructed with individual noncommunicating stud cavities or protect both boxes with listed putty pads.
 - 8. Locate junction and pull boxes as indicated, as required to facilitate installation of conductors, and to limit conduit length and/or number of bends between pulling points in accordance with Section 26 0533.13.
- I. Box Supports:
 - 1. Secure and support boxes in accordance with NFPA 70 and Section 26 0529 using suitable supports and methods approved by the authority having jurisdiction.
 - 2. Provide independent support from building structure except for cast metal boxes (other than boxes used for fixture support) supported by threaded conduit connections in accordance with NFPA 70. Do not provide support from piping, ductwork, or other systems.
- J. Install boxes plumb and level.
- K. Flush-Mounted Boxes:
 - 1. Install boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that front edge of box or associated raised cover is not set back from finished surface more than 1/4 inch or does not project beyond finished surface.
 - 2. Install boxes in combustible materials such as wood so that front edge of box or associated raised cover is flush with finished surface.
 - 3. Repair rough openings around boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that there are no gaps or open spaces greater than 1/8 inch at the edge of the box.
- L. Install boxes as required to preserve insulation integrity.
- M. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.
- N. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 8400.
- O. Close unused box openings.
- P. Install blank wall plates on junction boxes and on outlet boxes with no devices or equipment installed or designated for future use.
- Q. Provide grounding and bonding in accordance with Section 26 0526.

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3.03 PROTECTION

- A. Immediately after installation, protect boxes from entry of moisture and foreign material until ready for installation of conductors.

SECTION 260533.23
SURFACE RACEWAYS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Surface raceway systems.
- B. Wireways.

1.02 RELATED REQUIREMENTS

- A. Division 01 - General Requirements: Project administrative and procedural requirements.
- B. Division 02 - Existing Conditions: Demolition, cleaning and disposal requirements.
- C. Section 26 0005 - Basic Electrical Requirements.
- D. Section 26 0526 - Grounding and Bonding for Electrical Systems.
- E. Section 26 0529 - Hangers and Supports for Electrical Systems.
- F. Section 26 0533.13 - Conduit for Electrical Systems.
- G. Section 26 0533.16 - Boxes for Electrical Systems.
- H. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.
- I. Section 26 2726 - Wiring Devices: Receptacles.

1.03 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- B. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- C. NEMA PRP 5 - Installation Guidelines for Surface Nonmetallic Raceway 2015.
- D. UL 870 - Wireways, Auxiliary Gutters, and Associated Fittings Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the placement of raceways with millwork, furniture, equipment, etc. installed under other sections or by others.
 - 2. Coordinate rough-in locations of outlet boxes provided under Section 26 0533.16 and conduit provided under Section 26 0533.13 as required for installation of raceways provided under this section.
 - 3. Verify minimum sizes of raceways with the actual conductors and components to be installed.
 - 4. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- B. Sequencing:
 - 1. Do not install raceways until final surface finishes and painting are complete.
 - 2. Do not begin installation of conductors and cables until installation of raceways is complete between outlet, junction and splicing points.

1.05 SUBMITTALS

- A. Contractor shall provide submittals for equipment listed herein. Refer to Division 01 for submittal procedures.

- B. Product Data: Provide manufacturer's standard catalog pages and data sheets including dimensions, knockout sizes and locations, materials, fabrication details, finishes, service condition requirements, and accessories.
 - 1. Surface Raceway Systems: Include information on fill capacities for conductors and cables.

PART 2 PRODUCTS

2.01 RACEWAY REQUIREMENTS

- A. Provide all components, fittings, supports, and accessories required for a complete raceway system.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Do not use raceways for applications other than as permitted by NFPA 70 and product listing.

2.02 SURFACE RACEWAY SYSTEMS

- A. Manufacturers:
 - 1. Hubbell Incorporated: www.hubbell.com
 - 2. MonoSystems, Inc: www.monosystems.com
 - 3. Wiremold, a brand of Legrand North America, Inc: www.legrand.us

2.03 WIREWAYS

- A. Manufacturers:
 - 1. Cooper B-Line, a division of Cooper Industries: www.cooperindustries.com
 - 2. Enduro Composites: www.endurocomposites.com
 - 3. Hoffman, a brand of Pentair Technical Products: www.hoffmanonline.com
 - 4. Schneider Electric; Square D Products: www.schneider-electric.us
- B. Description: Lay-in wireways and wiring troughs with removable covers; listed and labeled as complying with UL 870.
- C. Wireway Type, Unless Otherwise Indicated:
- D. Where wireway size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that outlet boxes and conduit terminations are installed in proper locations and are properly sized in accordance with NFPA 70 to accommodate raceways.
- C. Verify that mounting surfaces are ready to receive raceways and that final surface finishes are complete, including painting.
- D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Surface Nonmetallic Raceways: Install in accordance with NEMA PRP 5.
- D. Install raceways plumb and level.
- E. Arrange wireways and associated raceway connections to comply with NFPA 70, including but not limited to requirements for deflected conductors and wireways used as pullboxes. Increase size of wireway where necessary.

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- F. Secure and support raceways in accordance with Section 26 0529 at intervals complying with NFPA 70 and manufacturer's requirements.
- G. Close unused raceway openings.
- H. Provide grounding and bonding in accordance with Section 26 0526.

**SECTION 260553
IDENTIFICATION FOR ELECTRICAL SYSTEMS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Electrical identification requirements.
- B. Identification nameplates and labels.
- C. Wire and cable markers.
- D. Voltage markers.
- E. Underground warning tape.
- F. Floor marking tape.
- G. Warning signs and labels.

1.02 RELATED REQUIREMENTS

- A. Division 01 - General Requirements: Project administrative and procedural requirements.
- B. Division 09 - Finishes: Interior and Exterior Painting.
- C. Section 09 9113 - Exterior Painting.
- D. Section 09 9123 - Interior Painting.
- E. Section 26 0005 - Basic Electrical Requirements
- F. Section 26 0519 - Low-Voltage Electrical Power Conductors and Cables: Color coding for power conductors and cables 600 V and less; vinyl color coding electrical tape.
- G. Section 26 0536 - Cable Trays for Electrical Systems: Additional identification requirements for cable tray systems.
- H. Section 26 0573 - Power System Studies: Arc flash hazard warning labels.
- I. Section 26 2726 - Wiring Devices: Device and wallplate finishes; factory pre-marked wallplates.

1.03 REFERENCE STANDARDS

- A. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- B. UL 969 - Marking and Labeling Systems Current Edition, Including All Revisions.

1.04 FIELD CONDITIONS

- A. Do not install adhesive products when ambient temperature is lower than recommended by manufacturer.

PART 2 PRODUCTS

2.01 IDENTIFICATION REQUIREMENTS

- A. Existing Work: Unless specifically excluded, identify existing elements to remain that are not already identified in accordance with specified requirements.
- B. Identification for Equipment:
 - 1. Use identification nameplate to identify each piece of electrical distribution and control equipment and associated sections, compartments, and components.
 - a. Panelboards:
 - 1) Identify ampere rating.
 - 2) Identify voltage and phase.

- 3) Identify power source and circuit number. Include location when not within sight of equipment.
- 4) Use typewritten circuit directory to identify load(s) served for panelboards with a door. Identify spares and spaces using pencil.
- 5) For power panelboards without a door, use identification nameplate to identify load(s) served for each branch device. Do not identify spares and spaces.
- b. Transformers:
 - 1) Identify kVA rating.
 - 2) Identify voltage and phase for primary and secondary.
 - 3) Identify power source and circuit number. Include location when not within sight of equipment.
- c. Enclosed switches, circuit breakers, and motor controllers:
 - 1) Identify voltage and phase.
 - 2) Identify power source and circuit number. Include location when not within sight of equipment.
 - 3) Identify load(s) served. Include location when not within sight of equipment.
- d. Transfer Switches:
 - 1) Identify voltage and phase.
 - 2) Identify short circuit current rating based on the specific overcurrent protective device type and settings protecting the transfer switch.
2. Service Equipment:
 - a. Use identification nameplate to identify each service disconnecting means.
3. Emergency System Equipment:
 - a. Use identification nameplate or voltage marker to identify emergency system equipment in accordance with NFPA 70.
 - b. Use identification nameplate at each piece of service equipment to identify type and location of on-site emergency power sources.
4. Use identification nameplate to identify disconnect location for equipment with remote disconnecting means.
5. Use identification label or handwritten text using indelible marker on inside of door at each fused switch to identify required NEMA fuse class and size.
6. Use field-painted floor markings, floor marking tape, or warning labels to identify required equipment working clearances where indicated or where required by the authority having jurisdiction.
 - a. Field-Painted Floor Markings: Alternating black and white stripes, 3 inches wide, painted in accordance with Section 09 9123 and 09 9113.
7. Available Fault Current Documentation: Use identification label to identify the available fault current and date calculations were performed at locations requiring documentation by NFPA 70 including but not limited to the following.
 - a. Service equipment.
 - b. Industrial control panels.
 - c. Motor control centers.
 - d. Elevator control panels.
 - e. Industrial machinery.
8. Arc Flash Hazard Warning Labels: Comply with Section 26 0573.
- C. Identification for Conductors and Cables:
 1. Color Coding for Power Conductors 600 V and Less: Comply with Section 26 0519.
 2. Use identification nameplate or identification label to identify color code for ungrounded and grounded power conductors inside door or enclosure at each piece of feeder or branch-circuit distribution equipment when premises has feeders or branch circuits served by more than one nominal voltage system.

- D. Identification for Cable Tray: Comply with Section 26 0536.
- E. Identification for Boxes:
 - 1. Use voltage markers to identify highest voltage present.
 - 2. Use voltage markers or color coded boxes to identify systems other than normal power system.
 - a. Color-Coded Boxes: Field-painted in accordance with Division 09 per the same color code used for raceways.
- F. Identification for Devices:
 - 1. Wiring Device and Wallplate Finishes: Comply with Section 26 2726.
 - 2. Use identification label to identify fire alarm system devices.
 - a. For devices concealed above suspended ceilings, provide additional identification on ceiling tile below device location.
 - 3. Use identification label to identify serving branch circuit for all receptacles.
 - a. For receptacles in public areas or in areas as directed by Architect, provide identification on inside surface of wallplate.
- G. Identification for Luminaires:
 - 1. Use permanent red dot on luminaire frame to identify luminaires connected to emergency power system.

2.02 IDENTIFICATION NAMEPLATES AND LABELS

- A. Identification Nameplates:
 - 1. Materials:
 - a. Indoor Clean, Dry Locations: Use plastic nameplates.
 - b. Outdoor Locations: Use plastic, stainless steel, or aluminum nameplates suitable for exterior use.
 - 2. Plastic Nameplates: Two-layer or three-layer laminated acrylic or electrically non-conductive phenolic with beveled edges; minimum thickness of 1/16 inch; engraved text.
 - 3. Stainless Steel Nameplates: Minimum thickness of 1/32 inch; engraved or laser-etched text.
 - 4. Aluminum Nameplates: Anodized; minimum thickness of 1/32 inch; engraved or laser-etched text.
 - 5. Mounting Holes for Mechanical Fasteners: Two, centered on sides for sizes up to 1 inch high; Four, located at corners for larger sizes.
- B. Identification Labels:
 - 1. Materials: Use self-adhesive laminated plastic labels; UV, chemical, water, heat, and abrasion resistant.
 - 2. Text: Use factory pre-printed or machine-printed text. Do not use handwritten text unless otherwise indicated.
- C. Format for Caution and Warning Messages:
 - 1. Minimum Size: 2 inches by 4 inches.
 - 2. Legend: Include information or instructions indicated or as required for proper and safe operation and maintenance.
 - 3. Text: All capitalized unless otherwise indicated.
 - 4. Minimum Text Height: 1/2 inch.
 - 5. Color: Black text on yellow background unless otherwise indicated.
- D. Format for Receptacle Identification:
 - 1. Minimum Size: 3/8 inch by 1.5 inches.
 - 2. Legend: Power source and circuit number or other designation indicated.
 - 3. Text: All capitalized unless otherwise indicated.

4. Minimum Text Height: 3/16 inch.
 5. Color: Black text on clear background.
- E. Format for Fire Alarm Device Identification:
1. Minimum Size: 3/8 inch by 1.5 inches.
 2. Legend: Designation indicated and device zone or address.
 3. Text: All capitalized unless otherwise indicated.
 4. Minimum Text Height: 3/16 inch.
 5. Color: Red text on white background.

2.03 VOLTAGE MARKERS

- A. Markers for Boxes and Equipment Enclosures: Use factory pre-printed self-adhesive vinyl or self-adhesive vinyl cloth type markers.
- B. Minimum Size:
1. Markers for Pull Boxes: 1 1/8 by 4 1/2 inches.
 2. Markers for Junction Boxes: 1/2 by 2 1/4 inches.
- C. Legend:
1. Markers for Voltage Identification: Highest voltage present.
 2. Markers for System Identification:
 - a. Emergency Power System: Text "EMERGENCY".
- D. Color: Black text on orange background unless otherwise indicated.

2.04 UNDERGROUND WARNING TAPE

- A. Materials: Use non-detectable type polyethylene tape suitable for direct burial, unless otherwise indicated.
- B. Non-detectable Type Tape: 6 inches wide, with minimum thickness of 4 mil.
- C. Legend: Type of service, continuously repeated over full length of tape.
- D. Color:
1. Tape for Buried Power Lines: Black text on red background.
 2. Tape for Buried Communication, Alarm, and Signal Lines: Black text on orange background.

2.05 FLOOR MARKING TAPE

- A. Floor Marking Tape for Equipment Working Clearance Identification: Self-adhesive vinyl or polyester tape with overlamine, 3 inches wide, with alternating black and white stripes.

2.06 WARNING SIGNS AND LABELS

- A. Comply with ANSI Z535.2 or ANSI Z535.4 as applicable.
- B. Warning Signs:
1. Materials:
 - a. Indoor Dry, Clean Locations: Use factory pre-printed rigid plastic or self-adhesive vinyl signs.
 - b. Outdoor Locations: Use factory pre-printed rigid aluminum signs.
 2. Rigid Signs: Provide four mounting holes at corners for mechanical fasteners.
 3. Minimum Size: 7 by 10 inches unless otherwise indicated.
- C. Warning Labels:
1. Materials: Use factory pre-printed or machine-printed self-adhesive polyester or self-adhesive vinyl labels; UV, chemical, water, heat, and abrasion resistant; produced using materials recognized to UL 969.
 2. Machine-Printed Labels: Use thermal transfer process printing machines and accessories recommended by label manufacturer.

3. Minimum Size: 2 by 4 inches unless otherwise indicated.

PART 3 EXECUTION

3.01 PREPARATION

- A. Clean surfaces to receive adhesive products according to manufacturer's instructions.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install identification products to be plainly visible for examination, adjustment, servicing, and maintenance. Unless otherwise indicated, locate products as follows:
 1. Surface-Mounted Equipment: Enclosure front.
 2. Flush-Mounted Equipment: Inside of equipment door.
 3. Free-Standing Equipment: Enclosure front; also enclosure rear for equipment with rear access.
 4. Elevated Equipment: Legible from the floor or working platform.
 5. Branch Devices: Adjacent to device.
 6. Interior Components: Legible from the point of access.
 7. Boxes: Outside face of cover.
 8. Conductors and Cables: Legible from the point of access.
 9. Devices: Outside face of cover.
- C. Install identification products centered, level, and parallel with lines of item being identified.
- D. Secure nameplates to exterior surfaces of enclosures using stainless steel screws and to interior surfaces using self-adhesive backing or epoxy cement.
- E. Install self-adhesive labels and markers to achieve maximum adhesion, with no bubbles or wrinkles and edges properly sealed.
- F. Install underground warning tape above buried lines with one tape per trench at 3 inches below finished grade.
- G. Secure rigid signs using stainless steel screws.
- H. Mark all handwritten text, where permitted, to be neat and legible.

**SECTION 260573
POWER SYSTEM STUDIES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Short-circuit study.
- B. Protective device coordination study.
- C. Arc flash and shock risk assessment.
 - 1. Includes arc flash hazard warning labels.
- D. Criteria for the selection and adjustment of equipment and associated protective devices not specified in this section, as determined by studies to be performed.

1.02 RELATED REQUIREMENTS

- A. Division 01 - General Requirements: Project administrative and procedural requirements.
- B. Section 26 0005 - Basic Electrical Requirements.
- C. Section 26 0553 - Identification for Electrical Systems: Additional requirements for arc flash hazard warning labels.
- D. Section 26 2416 - Panelboards.
- E. Section 26 2813 - Fuses.
- F. Section 26 2816.16 - Enclosed Switches.

1.03 REFERENCE STANDARDS

- A. ANSI Z535.4 - American National Standard for Product Safety Signs and Labels 2011.
- B. IEEE 141 - IEEE Recommended Practice for Electrical Power Distribution for Industrial Plants 1993 (Reaffirmed 1999).
- C. IEEE 242 - IEEE Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems 2001, with Errata (2003).
- D. IEEE 399 - IEEE Recommended Practice for Industrial and Commercial Power Systems Analysis 1997.
- E. IEEE 551 - IEEE Recommended Practice for Calculating Short-Circuit Currents in Industrial and Commercial Power Systems 2006.
- F. IEEE 1584 - IEEE Guide for Performing Arc-Flash Hazard Calculations 2018, with Errata (2019).
- G. NEMA MG 1 - Motors and Generators 2018.
- H. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems 2017.
- I. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- J. NFPA 70E - Standard for Electrical Safety in the Workplace 2018.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Existing Installations: Coordinate with equipment manufacturer(s) to obtain data necessary for completion of studies.
 - 2. Coordinate the work to provide equipment and associated protective devices complying with criteria for selection and adjustment, as determined by studies to be performed.

3. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- B. Sequencing:
1. Submit study reports prior to or concurrent with product submittals.
 2. Do not order equipment until matching study reports and product submittals have both been evaluated by Architect.

1.05 SUBMITTALS

- A. Contractor shall provide submittals for equipment listed herein. Refer to Division 01 for submittal procedures.
- B. Study reports, stamped or sealed and signed by study preparer.
- C. Product Data: In addition to submittal requirements specified in other sections, include manufacturer's standard catalog pages and data sheets for equipment and protective devices indicating information relevant to studies.
1. Identify modifications made in accordance with studies that:
 - a. Can be made at no additional cost to Owner.
 - b. As submitted will involve a change to the contract sum.

1.06 POWER SYSTEM STUDIES

- A. Scope of Studies:
1. Perform analysis of new electrical distribution system as indicated on drawings.
 2. Except where study descriptions below indicate exclusions, analyze system at each bus from primary protective devices of utility source down to each piece of equipment involved, including parts of system affecting calculations being performed (e.g. fault current contribution from motors).
 3. Include in analysis alternate sources and operating modes (including known future configurations) to determine worst case conditions.
- B. General Study Requirements:
1. Comply with NFPA 70.
 2. Perform studies utilizing computer software complying with specified requirements; manual calculations are not permitted.
- C. Data Collection:
1. Compile information on project-specific characteristics of actual installed equipment, protective devices, feeders, etc. as necessary to develop single-line diagram of electrical distribution system and associated input data for use in system modeling.
 - a. Utility Source Data: Include primary voltage, maximum and minimum three-phase and line-to-ground fault currents, impedance, X/R ratio, and primary protective device information.
 - 1) Obtain up-to-date information from Utility Company.
 - b. Generators: Include manufacturer/model, kW and voltage ratings, and impedance.
 - c. Motors: Include manufacturer/model, type (e.g. induction, synchronous), horsepower rating, voltage rating, full load amps, and locked rotor current or NEMA MG 1 code letter designation.
 - d. Transformers: Include primary and secondary voltage ratings, kVA rating, winding configuration, percent impedance, and X/R ratio.
 - e. Protective Devices:
 - 1) Circuit Breakers: Include manufacturer/model, type (e.g. thermal magnetic, electronic trip), frame size, trip rating, voltage rating, interrupting rating, available field-adjustable trip response settings, and features (e.g. zone selective interlocking).

- 2) Fuses: Include manufacturer/model, type/class (e.g. Class J), size/rating, and speed (e.g. time delay, fast acting).
 - f. Protective Relays: Include manufacturer/model, type, settings, current/potential transformer ratio, and associated protective device.
 - g. Conductors: Include feeder size, material (e.g. copper, aluminum), insulation type, voltage rating, number per phase, raceway type, and actual length.
- D. Short-Circuit Study:
1. Comply with IEEE 551 and applicable portions of IEEE 141, IEEE 242, and IEEE 399.
 2. For purposes of determining equipment short circuit current ratings, consider conditions that may result in maximum available fault current, including but not limited to:
 - a. Maximum utility fault currents.
 - b. Maximum motor contribution.
 - c. Known operating modes (e.g. utility as source, generator as source, utility/generator in parallel, bus tie breaker open/close positions).
 3. For each bus location, calculate the maximum available three-phase bolted symmetrical and asymmetrical fault currents. For grounded systems, also calculate the maximum available line-to-ground bolted fault currents.
- E. Arc Flash and Shock Risk Assessment:
1. Comply with NFPA 70E.
 2. Perform incident energy and arc flash boundary calculations in accordance with IEEE 1584 (as referenced in NFPA 70E Annex D), where applicable.
 3. Analyze alternate scenarios considering conditions that may result in maximum incident energy, including but not limited to:
 - a. Maximum and minimum utility fault currents.
 - b. Maximum and minimum motor contribution.
 - c. Known operating modes (e.g. utility as source, generator as source, utility/generator in parallel, bus tie breaker open/close positions).
- F. Study Reports:
1. General Requirements:
 - a. Identify date of study and study preparer.
 - b. Identify study methodology and software product(s) used.
 - c. Identify scope of studies, assumptions made, implications of possible alternate scenarios, and any exclusions from studies.
 - d. Identify base used for per unit values.
 - e. Include single-line diagram and associated input data used for studies; identify buses on single-line diagram as referenced in reports, and indicate bus voltage.
 - f. Include conclusions and recommendations.
 2. Short-Circuit Study:
 - a. For each scenario, identify at each bus location:
 - 1) Calculated maximum available symmetrical and asymmetrical fault currents (both three-phase and line-to-ground where applicable).
 - 2) Fault point X/R ratio.
 - 3) Associated equipment short circuit current ratings.
 - b. Identify locations where the available fault current exceeds the equipment short circuit current rating, along with recommendations.
 3. Arc Flash and Shock Risk Assessment:
 - a. For the worst case for each scenario, identify at each bus location:
 - 1) Calculated incident energy and associated working distance.
 - 2) Calculated arc flash boundary.
 - 3) Bolted fault current.

- 4) Arcing fault current.
 - 5) Clearing time.
 - 6) Arc gap distance.
- b. For purposes of producing arc flash hazard warning labels, summarize the maximum incident energy and associated data reflecting the worst case condition of all scenarios at each bus location.

1.07 QUALITY ASSURANCE

- A. Study Preparer Qualifications: Professional electrical engineer licensed in the State in which the Project is located and with minimum five years experience in the preparation of studies of similar type and complexity using specified computer software.
- B. Computer Software for Study Preparation: Use the latest edition of commercially available software utilizing specified methodologies.

PART 2 PRODUCTS

2.01 ARC FLASH HAZARD WARNING LABELS

- A. Provide warning labels complying with ANSI Z535.4 to identify arc flash hazards for each work location analyzed by the arc flash and shock risk assessment.
 1. Materials: Comply with Section 26 0553.
 2. Legend: Provide custom legend in accordance with NFPA 70E based on equipment-specific data as determined by arc flash and shock risk assessment.
 - a. Include the following information:
 - 1) Arc flash boundary.
 - 2) Available incident energy and corresponding working distance.
 - 3) Nominal system voltage.
 - 4) Equipment identification.
 - 5) Date calculations were performed.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install arc flash warning labels in accordance with Section 26 0553.

3.02 FIELD QUALITY CONTROL

- A. Provide the services of field testing agency or equipment manufacturer's representative to perform inspection, testing, and adjusting.
- B. Inspect and test in accordance with NETA ATS, except Section 4.
- C. Adjust equipment and protective devices for compliance with studies and recommended settings.
- D. Notify Strategic Energy Solutions, Inc. of any conflicts with or deviations from studies. Obtain direction before proceeding.

**SECTION 262200
VOLTAGE TRANSFORMERS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. General purpose transformers.

1.02 RELATED REQUIREMENTS

- A. Division 01 - General Requirements: Project administrative and procedural requirements.
- B. Division 03 - Concrete: Concrete equipment pads.
- C. Section 03 3000 - Cast-in-Place Concrete: Concrete equipment pads.
- D. Section 26 0005 - Basic Electrical Requirements
- E. Section 26 0526 - Grounding and Bonding for Electrical Systems.
- F. Section 26 0529 - Hangers and Supports for Electrical Systems.
- G. Section 26 0533.13 - Conduit for Electrical Systems: Flexible conduit connections.
- H. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.
- I. Section 26 2416 - Panelboards.

1.03 REFERENCE STANDARDS

- A. 10 CFR 431, Subpart K - Energy Efficiency Program for Certain Commercial and Industrial Equipment - Distribution Transformers Current Edition.
- B. IEEE C57.94 - IEEE Recommended Practice for Installation, Application, Operation, and Maintenance of Dry-Type Distribution and Power Transformers 2015.
- C. IEEE C57.96 - IEEE Standard Guide for Loading Dry-Type Distribution and Power Transformers 2013.
- D. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- E. NECA 409 - Standard for Installing and Maintaining Dry-Type Transformers 2015.
- F. NEMA ST 20 - Dry-Type Transformers for General Applications 2014.
- G. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2020.
- H. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems 2017.
- I. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- J. UL 506 - Standard for Specialty Transformers Current Edition, Including All Revisions.
- K. UL 1561 - Standard for Dry-Type General Purpose and Power Transformers Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances required by NFPA 70.
 - 2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
 - 3. Coordinate the work with placement of supports, anchors, etc. required for mounting.
 - 4. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.

5. Notify Strategic Energy Solutions, Inc. of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

- A. Contractor shall provide submittals for equipment listed herein. Refer to Division 01 for submittal procedures.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.

1.07 FIELD CONDITIONS

- A. Ambient Temperature: Do not exceed the following maximum temperatures during and after installation of transformers.
 1. Greater than 10 kVA: 104 degrees F maximum.
 2. Less than 10 kVA: 77 degrees F maximum.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. ABB/GE: www.geindustrial.com
- B. Eaton Corporation: www.eaton.com
- C. Schneider Electric; Square D Products: www.schneider-electric.us
- D. Siemens Industry, Inc: www.usa.siemens.com
- E. Source Limitations: Furnish transformers produced by the same manufacturer as the other electrical distribution equipment used for this project and obtained from a single supplier.

2.02 TRANSFORMERS - GENERAL REQUIREMENTS

- A. Description: Factory-assembled, dry type transformers for 60 Hz operation designed and manufactured in accordance with NEMA ST 20 and listed, classified, and labeled as suitable for the purpose intended.
- B. Unless noted otherwise, transformer ratings indicated are for continuous loading according to IEEE C57.96 under the following service conditions:
 1. Altitude: Less than 3,300 feet.
 2. Ambient Temperature:
 - a. Greater than 10 kVA: Not exceeding 104 degrees F.
 - b. Less than 10 kVA: Not exceeding 77 degrees F.
- C. Core: High grade, non-aging silicon steel with high magnetic permeability and low hysteresis and eddy current losses. Keep magnetic flux densities substantially below saturation point, even at 10 percent primary overvoltage. Tightly clamp core laminations to prevent plate movement and maintain consistent pressure throughout core length.
- D. Impregnate core and coil assembly with non-hydroscopic thermo-setting varnish to effectively seal out moisture and other contaminants.
- E. Basic Impulse Level: 10 kV.
- F. Ground core and coil assembly to enclosure by means of a visible flexible copper grounding strap.
- G. Isolate core and coil from enclosure using vibration-absorbing mounts.
- H. Nameplate: Include transformer connection data, ratings, wiring diagrams, and overload capacity based on rated winding temperature rise.

2.03 GENERAL PURPOSE TRANSFORMERS

- A. Description: Self-cooled, two winding transformers listed and labeled as complying with UL 506 or UL 1561; ratings as indicated on the drawings.
- B. Insulation System and Allowable Average Winding Temperature Rise:
 - 1. Less than 15 kVA: Class 180 degrees C insulation system with 115 degrees C average winding temperature rise.
 - 2. 15 kVA and Larger: Class 220 degrees C insulation system with 150 degrees C average winding temperature rise.
- C. Coil Conductors: Continuous aluminum windings with terminations brazed or welded.
- D. Winding Taps:
 - 1. Less than 3 kVA: None.
 - 2. 3 kVA through 15 kVA: Two 5 percent full capacity primary taps below rated voltage.
 - 3. 15 kVA through 300 kVA: Two 2.5 percent full capacity primary taps above and four 2.5 percent full capacity primary taps below rated voltage.
 - 4. 500 kVA and Larger: Two 2.5 percent full capacity primary taps above and two 2.5 percent full capacity primary taps below rated voltage.
- E. Energy Efficiency: Comply with 10 CFR 431, Subpart K.
- F. Sound Levels: Standard sound levels complying with NEMA ST 20
- G. Mounting Provisions:
 - 1. Less than 15 kVA: Suitable for wall mounting.
 - 2. 15 kVA through 75 kVA: Suitable for wall, floor, or trapeze mounting.
 - 3. Larger than 75 kVA: Suitable for floor mounting.
- H. Transformer Enclosure: Comply with NEMA ST 20.
 - 1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
 - 2. Construction: Steel.
 - a. Less than 15 kVA: Totally enclosed, non-ventilated.
 - b. 15 kVA and Larger: Ventilated.
 - 3. Finish: Manufacturer's standard grey, suitable for outdoor installations.
 - 4. Provide lifting eyes or brackets.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that suitable support frames and anchors are installed where required and that mounting surfaces are ready to receive transformers.
- C. Perform pre-installation tests and inspections on transformers per manufacturer's instructions and as specified in NECA 409. Correct deficiencies prior to installation.
- D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Perform work in accordance with NECA 1 (general workmanship).
- B. Install products in accordance with manufacturer's instructions.
- C. Install transformers in accordance with NECA 409 and IEEE C57.94.
- D. Use flexible conduit, under the provisions of Section 26 0533.13, 2 feet minimum length, for connections to transformer case. Make conduit connections to side panel of enclosure.
- E. Arrange equipment to provide minimum clearances as specified on transformer nameplate and in accordance with manufacturer's instructions and NFPA 70.

- F. Install transformers plumb and level.
- G. Transformer Support:
 - 1. Provide required support and attachment in accordance with Section 26 0529, where not furnished by transformer manufacturer.
 - 2. Use integral transformer flanges, accessory brackets furnished by manufacturer, or field-fabricated supports to support wall-mounted transformers.
 - 3. Unless otherwise indicated, mount floor-mounted transformers on properly sized 3 inch high concrete pad constructed in accordance with Section 03 3000.
 - 4. Use trapeze hangers assembled from threaded rods and metal channel (strut) to support suspended transformers. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
- H. Provide grounding and bonding in accordance with Section 26 0526.
- I. Remove shipping braces and adjust bolts that attach the core and coil mounting bracket to the enclosure according to manufacturer's recommendations in order to reduce audible noise transmission.
- J. Where not factory-installed, install lugs sized as required for termination of conductors as indicated.
- K. Identify transformers in accordance with Section 26 0553.

3.03 ADJUSTING

- A. Measure primary and secondary voltages and make appropriate tap adjustments.
- B. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.

**SECTION 262413
SWITCHBOARDS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Low-voltage (600 V and less) switchboards and associated accessories for service and distribution applications.
- B. Overcurrent protective devices for switchboards.

1.02 RELATED REQUIREMENTS

- A. Division 01 - General Requirements: Project administrative and procedural requirements.
- B. Division 03 - Concrete: Concrete equipment pads.
- C. Section 03 3000 - Cast-in-Place Concrete: Concrete equipment pads.
- D. Section 26 0005 - Basic Electrical Requirements.
- E. Section 26 0526 - Grounding and Bonding for Electrical Systems.
- F. Section 26 0529 - Hangers and Supports for Electrical Systems.
- G. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.
- H. Section 26 0573 - Power System Studies: Additional criteria for the selection and adjustment of equipment and associated protective devices specified in this section.
- I. Section 26 2300 - Low-Voltage Switchgear.
- J. Section 26 2813 - Fuses: Fuses for fusible switches.

1.03 REFERENCE STANDARDS

- A. FS W-C-375 - Circuit Breakers, Molded Case; Branch Circuit and Service 2013e (Amended 2017).
- B. IEEE C57.13 - IEEE Standard Requirements for Instrument Transformers 2016.
- C. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- D. NECA 400 - Standard for Installing and Maintaining Switchboards 2007.
- E. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2020.
- F. NEMA PB 2 - Deadfront Distribution Switchboards 2011.
- G. NEMA PB 2.1 - General Instructions for Proper Handling, Installation, Operation, and Maintenance of Deadfront Distribution Switchboards Rated 600 Volts or Less 2013.
- H. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems 2017.
- I. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- J. UL 98 - Enclosed and Dead-Front Switches Current Edition, Including All Revisions.
- K. UL 489 - Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures Current Edition, Including All Revisions.
- L. UL 869A - Reference Standard for Service Equipment Current Edition, Including All Revisions.
- M. UL 891 - Switchboards Current Edition, Including All Revisions.
- N. UL 1053 - Ground-Fault Sensing and Relaying Equipment Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances required by NFPA 70.
 - 2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
 - 3. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.
 - 4. Coordinate with manufacturer to provide shipping splits suitable for the dimensional constraints of the installation.
 - 5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- B. Service Entrance Switchboards:
 - 1. Coordinate with Utility Company to provide switchboards with suitable provisions for electrical service and utility metering, where applicable.
 - 2. Coordinate with Owner to arrange for Utility Company required access to equipment for installation and maintenance.
 - 3. Obtain Utility Company approval of switchboard prior to fabrication.
 - 4. Arrange for inspections necessary to obtain Utility Company approval of installation.

1.05 SUBMITTALS

- A. Contractor shall provide submittals for equipment listed herein. Refer to Division 01 for submittal procedures.
- B. Shop Drawings: Indicate dimensions, voltage, bus ampacities, overcurrent protective device arrangement and sizes, short circuit current ratings, conduit entry locations, conductor terminal information, and installed features and accessories.
 - 1. Include dimensioned plan and elevation views of switchboards and adjacent equipment with all required clearances indicated.
 - 2. Clearly indicate whether proposed short circuit current ratings are fully rated or, where acceptable, series rated systems.
 - 3. Include documentation of listed series ratings as indicated in Section 26 0573.
- C. Service Entrance Switchboards: Include documentation of Utility Company approval of switchboard.
- D. Project Record Documents: Record actual installed locations of switchboards and final equipment settings.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store switchboards in accordance with manufacturer's instructions, NECA 400, and NEMA PB 2.1.
- B. Store in a clean, dry space having a uniform temperature to prevent condensation (including outdoor switchboards, which are not weatherproof until completely and properly installed). Where necessary, provide temporary enclosure space heaters or temporary power for permanent factory-installed space heaters.
- C. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- D. Handle carefully to avoid damage to switchboard internal components, enclosure, and finish.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Switchboards:
 - 1. ABB/GE: www.geindustrial.com
 - 2. Eaton Corporation: www.eaton.com
 - 3. Schneider Electric; Square D Products: www.schneider-electric.us
 - 4. Siemens Industry, Inc: www.usa.siemens.com

2.02 SWITCHBOARDS

- A. Provide switchboards consisting of all required components, control power transformers, instrumentation and control wiring, accessories, etc. as necessary for a complete operating system.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Description: Dead-front switchboard assemblies complying with NEMA PB 2, and listed and labeled as complying with UL 891; ratings, configurations and features as indicated on the drawings.
- D. Service Entrance Switchboards:
 - 1. Listed and labeled as suitable for use as service equipment according to UL 869A.
 - 2. For solidly-grounded wye systems, provide factory-installed main bonding jumper between neutral and ground busses, and removable neutral disconnecting link for testing purposes.
 - 3. Comply with Utility Company requirements for electrical service.
 - 4. Utility Metering Provisions: Provide separate barriered compartment complying with Utility Company requirements where indicated or where required by Utility Company. Include hinged sealable door and provisions for Utility Company current transformers (CTs), potential transformers (PTs), or potential taps as required.
- E. Switchboards With Fire Pump Taps: Provide separate bussed vertical section with suitable lugs for fire pump connection to line side of main service disconnect device(s).
- F. Service Conditions:
 - 1. Provide switchboards and associated components suitable for operation under the following service conditions without derating:
 - a. Altitude: Less than 6,600 feet.
 - b. Ambient Temperature:
 - 1) Switchboards Containing Molded Case or Insulated Case Circuit Breakers: Between 23 degrees F and 104 degrees F.
 - 2. Provide switchboards and associated components suitable for operation at indicated ratings under the service conditions at the installed location.
- G. Short Circuit Current Rating:
 - 1. Provide switchboards with listed short circuit current rating not less than the available fault current at the installed location as indicated on the drawings.
- H. Main Devices: Configure for top or bottom incoming feed as indicated or as required for the installation. Provide separate pull section and/or top-mounted pullbox as indicated or as required to facilitate installation of incoming feed.
- I. Bussing: Sized in accordance with UL 891 temperature rise requirements.
 - 1. Through bus (horizontal cross bus) to be fully rated through full length of switchboard (non-tapered). Tapered bus is not permitted.
 - 2. Provide fully rated neutral bus unless otherwise indicated, with a suitable lug for each feeder or branch circuit requiring a neutral connection.
 - 3. Provide solidly bonded equipment ground bus through full length of switchboard, with a suitable lug for each feeder and branch circuit equipment grounding conductor.
 - 4. Phase and Neutral Bus Material: Aluminum.

5. Ground Bus Material: Aluminum.
- J. Conductor Terminations: Suitable for use with the conductors to be installed.
 1. Line Conductor Terminations:
 - a. Main and Neutral Lug Material: Copper
 - b. Main and Neutral Lug Type: Mechanical.
 2. Load Conductor Terminations:
 - a. Lug Material: Copper
 - b. Lug Type:
 - 1) Provide mechanical lugs unless otherwise indicated.
- K. Enclosures:
 1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
 - a. Indoor Clean, Dry Locations: Type 1 or Type 2 (drip-proof).
 - b. Outdoor Locations: Type 3R.
 2. Finish: Manufacturer's standard unless otherwise indicated.
- L. Future Provisions:
 1. Prepare designated spaces for future installation of devices including bussing, connectors, mounting hardware and all other required provisions.
- M. Ground Fault Protection: Where ground-fault protection is indicated, provide system listed and labeled as complying with UL 1053.
- N. Arc Flash Energy-Reducing Maintenance Switching: For circuit breakers rated 1200 A or higher, provide a local accessory switch with status indicator light that permits selection of a maintenance mode with alternate electronic trip unit settings for reduced fault clearing time.
- O. Owner Metering:
 1. Provide microprocessor-based digital electrical metering system including all instrument transformers, wiring, and connections necessary for measurements specified.
 2. Measured Parameters:
 - a. Voltage (Volts AC): Line-to-line, line-to-neutral for each phase.
 - b. Current (Amps): For each phase and neutral.
 - c. Frequency (Hz).
 - d. Real power (kW): For each phase, 3-phase total.
 - e. Reactive power (kVAR): For each phase, 3-phase total.
 - f. Apparent power (kVA): For each phase, 3-phase total.
 - g. Power factor.
 3. Meter Accuracy: Plus/minus 1.0 percent.
- P. Instrument Transformers:
 1. Comply with IEEE C57.13.
 2. Select suitable ratio, burden, and accuracy as required for connected devices.
 3. Current Transformers: Connect secondaries to shorting terminal blocks.
 4. Potential Transformers: Include primary and secondary fuses with disconnecting means.

2.03 OVERCURRENT PROTECTIVE DEVICES

- A. Circuit Breakers:
 1. Interrupting Capacity:
 - a. Provide circuit breakers with interrupting capacity as required to provide the short circuit current rating indicated, but not less than specified minimum requirements.
 - b. Fully Rated Systems: Provide circuit breakers with interrupting capacity not less than the short circuit current rating indicated.
 2. Molded Case Circuit Breakers:

- a. Description: Quick-make, quick-break, over center toggle, trip-free, trip-indicating circuit breakers; listed and labeled as complying with UL 489, and complying with FS W-C-375 where applicable; ratings, configurations, and features as indicated on the drawings.
 - 1) Provide thermal magnetic circuit breakers unless otherwise indicated.
 - 2) Provide electronic trip circuit breakers where indicated.
- b. Thermal Magnetic Circuit Breakers: For each pole, furnish thermal inverse time tripping element for overload protection and magnetic instantaneous tripping element for short circuit protection.
- c. Electronic Trip Circuit Breakers: Furnish solid state, microprocessor-based, true rms sensing trip units.
 - 1) Provide the following field-adjustable trip response settings:
 - (a) Long time pickup, adjustable by replacing interchangeable trip unit or by setting dial.
 - (b) Long time delay.
 - (c) Short time pickup and delay.
 - (d) Instantaneous pickup.
 - (e) Ground fault pickup and delay where ground fault protection is indicated.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install switchboards in accordance with NECA 1 (general workmanship), NECA 400, and NEMA PB 2.1.
- C. Arrange equipment to provide required clearances and maintenance access, including accommodations for any drawout devices.
- D. Where switchboard is indicated to be mounted with inaccessible side against wall, provide minimum clearance of 1/2 inch between switchboard and wall.
- E. Provide required support and attachment in accordance with Section 26 0529.
- F. Install switchboards plumb and level.
- G. Unless otherwise indicated, mount switchboards on properly sized 4 inch high concrete pad constructed in accordance with Section 03 3000.
- H. Provide grounding and bonding in accordance with Section 26 0526.
- I. Install all field-installed devices, components, and accessories.
- J. Where accessories are not self-powered, provide control power source as indicated or as required to complete installation.
- K. Set field-adjustable circuit breaker tripping function settings as indicated.
- L. Set field-adjustable ground fault protection pickup and time delay settings as indicated.
- M. Provide filler plates to cover unused spaces in switchboards.

3.02 FIELD QUALITY CONTROL

- A. Before energizing switchboard, perform insulation resistance testing in accordance with NECA 400 and NEMA PB 2.1.
- B. Inspect and test in accordance with NETA ATS, except Section 4.
- C. Perform inspections and tests listed in NETA ATS, Section 7.1.
- D. Molded Case and Insulated Case Circuit Breakers: Perform inspections and tests listed in NETA ATS, Section 7.6.1.1 for all main circuit breakers and circuit breakers larger than _____

amperes. Tests listed as optional are not required.

- E. Ground Fault Protection Systems: Test in accordance with manufacturer's instructions as required by NFPA 70.
 - 1. Perform inspections and tests listed in NETA ATS, Section 7.14. The insulation-resistance test on control wiring listed as optional is not required.
- F. Meters: Perform inspections and tests listed in NETA ATS, Section 7.11.2.
- G. Instrument Transformers: Perform inspections and tests listed in NETA ATS, Section 7.10. The dielectric withstand tests on primary windings with secondary windings connected to ground listed as optional are not required.
- H. Correct deficiencies and replace damaged or defective switchboards or associated components.

3.03 ADJUSTING

- A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.
- B. Adjust alignment of switchboard covers and doors.

**SECTION 262416
PANELBOARDS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Power distribution panelboards.
- B. Lighting and appliance panelboards.
- C. Overcurrent protective devices for panelboards.

1.02 RELATED REQUIREMENTS

- A. Division 01 - General Requirements: Project administrative and procedural requirements.
- B. Division 02 - Existing Conditions: Demolition, cleaning and disposal requirements, cutting and patching requirements, and repairs.
- C. Division 03 - Concrete: Concrete equipment pads.
- D. Section 26 0005 - Basic Electrical Requirements.
- E. Section 26 0526 - Grounding and Bonding for Electrical Systems.
- F. Section 26 0529 - Hangers and Supports for Electrical Systems.
- G. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.
- H. Section 26 0573 - Power System Studies: Additional criteria for the selection and adjustment of equipment and associated protective devices specified in this section.
- I. Section 26 2200 - Low-Voltage Transformers: Small power centers with integral primary breaker, transformer, and panelboard.
- J. Section 26 2813 - Fuses: Fuses for fusible switches and spare fuse cabinets.
- K. Section 26 4300 - Surge Protective Devices.

1.03 REFERENCE STANDARDS

- A. FS W-C-375 - Circuit Breakers, Molded Case; Branch Circuit and Service 2013e (Amended 2017).
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- C. NECA 407 - Standard for Installing and Maintaining Panelboards 2015.
- D. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2020.
- E. NEMA PB 1 - Panelboards 2011.
- F. NEMA PB 1.1 - General Instructions for Proper Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less 2013.
- G. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems 2017.
- H. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- I. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations Current Edition, Including All Revisions.
- J. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations Current Edition, Including All Revisions.
- K. UL 67 - Panelboards Current Edition, Including All Revisions.

- L. UL 489 - Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures Current Edition, Including All Revisions.
- M. UL 869A - Reference Standard for Service Equipment Current Edition, Including All Revisions.
- N. UL 943 - Ground-Fault Circuit-Interrupters Current Edition, Including All Revisions.
- O. UL 1699 - Arc-Fault Circuit-Interrupters Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.
 - 2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
 - 3. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted panelboards where indicated.
 - 4. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.
 - 5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

- A. Contractor shall provide submittals for equipment listed herein. Refer to Division 01 for submittal procedures.
- B. Shop Drawings: Indicate outline and support point dimensions, voltage, main bus ampacity, overcurrent protective device arrangement and sizes, short circuit current ratings, conduit entry locations, conductor terminal information, and installed features and accessories.
 - 1. Include documentation of listed series ratings as indicated in Section 26 0573.
- C. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. Panelboard Keys: Two of each different key.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. ABB/GE: www.geindustrial.com
- B. Eaton Corporation: www.eaton.com
- C. Schneider Electric; Square D Products: www.schneider-electric.us
- D. Siemens Industry, Inc: www.usa.siemens.com
- E. Source Limitations: Furnish panelboards and associated components produced by the same manufacturer as the other electrical distribution equipment used for this project and obtained from a single supplier.

2.02 PANELBOARDS - GENERAL REQUIREMENTS

- A. Provide products listed, classified, and labeled as suitable for the purpose intended.
- B. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:
 - 1. Altitude: Less than 6,600 feet.
 - 2. Ambient Temperature:

- a. Panelboards Containing Circuit Breakers: Between 23 degrees F and 104 degrees F.
- b. Panelboards Containing Fusible Switches: Between -22 degrees F and 104 degrees F.
- C. Short Circuit Current Rating:
 1. Provide panelboards with listed short circuit current rating not less than the available fault current at the installed location as indicated on the drawings.
- D. Panelboards Used for Service Entrance: Listed and labeled as suitable for use as service equipment according to UL 869A.
- E. Mains: Configure for top or bottom incoming feed as indicated or as required for the installation.
- F. Branch Overcurrent Protective Devices: Replaceable without disturbing adjacent devices.
- G. Bussing: Sized in accordance with UL 67 temperature rise requirements.
 1. Provide solidly bonded equipment ground bus in each panelboard, with a suitable lug for each feeder and branch circuit equipment grounding conductor.
- H. Conductor Terminations: Suitable for use with the conductors to be installed.
- I. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.
 1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
 - a. Indoor Clean, Dry Locations: Type 1.
 - b. Outdoor Locations: Type 3R.
 2. Boxes: Galvanized steel unless otherwise indicated.
 - a. Provide wiring gutters sized to accommodate the conductors to be installed.
 - b. Increase gutter space as required where sub-feed lugs, feed-through lugs, gutter taps, or oversized lugs are provided.
 3. Fronts:
 - a. Fronts for Surface-Mounted Enclosures: Same dimensions as boxes.
 - b. Fronts for Flush-Mounted Enclosures: Overlap boxes on all sides to conceal rough opening.
 4. Lockable Doors: All locks keyed alike unless otherwise indicated.
- J. Future Provisions: Prepare all unused spaces for future installation of devices including bussing, connectors, mounting hardware and all other required provisions.
- K. Surge Protective Devices: Where factory-installed, internally mounted surge protective devices are provided in accordance with Section 26 4300, list and label panelboards as a complete assembly including surge protective device.
 1. Provide Surge Protective Devices internally mounted within all panels which are specified as part of the Emergency distribution power system.
- L. Multi-Section Panelboards: Provide enclosures of the same height, with feed-through lugs or sub-feed lugs and feeders as indicated or as required to interconnect sections.
- M. Load centers are not acceptable.

2.03 POWER DISTRIBUTION PANELBOARDS

- A. Description: Panelboards complying with NEMA PB 1, power and feeder distribution type, circuit breaker type, and listed and labeled as complying with UL 67; ratings, configurations and features as indicated on the drawings.
- B. Conductor Terminations:
 1. Main and Neutral Lug Material: Copper
 2. Main and Neutral Lug Type: Mechanical.

- C. Bussing:
 - 1. Phase and Neutral Bus Material: Copper
 - 2. Ground Bus Material: Copper
- D. Circuit Breakers:
 - 1. Provide bolt-on type or plug-in type secured with locking mechanical restraints.
- E. Enclosures:
 - 1. Provide surface-mounted enclosures unless otherwise indicated.
 - 2. Fronts: Provide trims to cover access to load terminals, wiring gutters, and other live parts, with exposed access to overcurrent protective device handles.
 - 3. Provide clear plastic circuit directory holder mounted on inside of door.

2.04 LIGHTING AND APPLIANCE PANELBOARDS

- A. Description: Panelboards complying with NEMA PB 1, lighting and appliance branch circuit type, circuit breaker type, and listed and labeled as complying with UL 67; ratings, configurations and features as indicated on the drawings.
- B. Conductor Terminations:
 - 1. Main and Neutral Lug Material: Copper
 - 2. Main and Neutral Lug Type: Mechanical.
- C. Bussing:
 - 1. Phase Bus Connections: Arranged for sequential phasing of overcurrent protective devices.
 - 2. Phase and Neutral Bus Material: Copper
 - 3. Ground Bus Material: Copper
- D. Circuit Breakers: Thermal magnetic bolt-on type unless otherwise indicated.
- E. Enclosures:
 - 1. Provide surface-mounted or flush-mounted enclosures as indicated.
 - 2. Provide clear plastic circuit directory holder mounted on inside of door.

2.05 OVERCURRENT PROTECTIVE DEVICES

- A. Molded Case Circuit Breakers:
 - 1. Description: Quick-make, quick-break, over center toggle, trip-free, trip-indicating circuit breakers listed and labeled as complying with UL 489, and complying with FS W-C-375 where applicable; ratings, configurations, and features as indicated on the drawings.
 - 2. Interrupting Capacity:
 - a. Provide circuit breakers with interrupting capacity as required to provide the short circuit current rating indicated.
 - b. Fully Rated Systems: Provide circuit breakers with interrupting capacity not less than the short circuit current rating indicated.
 - 3. Conductor Terminations:
 - a. Lug Material: Copper
 - 4. Thermal Magnetic Circuit Breakers: For each pole, furnish thermal inverse time tripping element for overload protection and magnetic instantaneous tripping element for short circuit protection.
 - 5. Multi-Pole Circuit Breakers: Furnish with common trip for all poles.
 - 6. Provide the following circuit breaker types where indicated:
 - a. Ground Fault Circuit Interrupter (GFCI) Circuit Breakers: Listed as complying with UL 943, class A for protection of personnel.
 - b. Ground Fault Equipment Protection Circuit Breakers: Designed to trip at 30 mA for protection of equipment.

- c. Arc-Fault Circuit Interrupter (AFCI) Circuit Breakers: Combination type listed as complying with UL 1699.
- d. 100 Percent Rated Circuit Breakers: Listed for application within the panelboard where installed at 100 percent of the continuous current rating.
7. Do not use tandem circuit breakers.
8. Do not use handle ties in lieu of multi-pole circuit breakers.
9. Provide multi-pole circuit breakers for multi-wire branch circuits as required by NFPA 70.
10. Provide the following features and accessories where indicated or where required to complete installation:

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that the ratings and configurations of the panelboards and associated components are consistent with the indicated requirements.
- C. Verify that mounting surfaces are ready to receive panelboards.
- D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Perform work in accordance with NECA 1 (general workmanship).
- B. Install products in accordance with manufacturer's instructions.
- C. Install panelboards in accordance with NECA 407 and NEMA PB 1.1.
- D. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- E. Provide required support and attachment in accordance with Section 26 0529.
- F. Install panelboards plumb.
- G. Install flush-mounted panelboards so that trims fit completely flush to wall with no gaps and rough opening completely covered.
- H. Mount panelboards such that the highest position of any operating handle for circuit breakers or switches does not exceed 79 inches above the floor or working platform.
- I. Provide minimum of six spare 1 inch trade size conduits out of each flush-mounted panelboard stubbed into accessible space above ceiling and below floor.
- J. Provide grounding and bonding in accordance with Section 26 0526.
- K. Install all field-installed branch devices, components, and accessories.
- L. Provide filler plates to cover unused spaces in panelboards.
- M. Provide code required clearance access on floor in front of panel with black and yellow striped tape. Clearance shall be width of panel and appropriate distance per NEC from panelboard.
- N. Provide circuit breaker lock-on devices to prevent unauthorized personnel from de-energizing essential loads where indicated. Also provide for the following:
 1. Fire detection and alarm circuits.
 2. Intrusion detection and access control system circuits.
 3. Video surveillance system circuits.

3.03 FIELD QUALITY CONTROL

- A. Inspect and test in accordance with NETA ATS, except Section 4.
- B. Fusible Switches: Perform inspections and tests listed in NETA ATS, Section 7.5.1.1.

- C. Molded Case Circuit Breakers: Perform inspections and tests listed in NETA ATS, Section 7.6.1.1 for all main circuit breakers and circuit breakers larger than _____ amperes. Tests listed as optional are not required.
- D. Ground Fault Protection Systems: Test in accordance with manufacturer's instructions as required by NFPA 70.
- E. Test GFCI circuit breakers to verify proper operation.
- F. Test AFCI circuit breakers to verify proper operation.
- G. Correct deficiencies and replace damaged or defective panelboards or associated components.

3.04 ADJUSTING

- A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.
- B. Adjust alignment of panelboard fronts.
- C. Load Balancing: For each panelboard, rearrange circuits such that the difference between each measured steady state phase load does not exceed 20 percent and adjust circuit directories accordingly. Maintain proper phasing for multi-wire branch circuits.

**SECTION 262726
WIRING DEVICES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Wall switches.
- B. Receptacles.
- C. Wall plates.

1.02 RELATED REQUIREMENTS

- A. Division 01 - General Requirements: Project administrative and procedural requirements.
- B. Division 02 - Existing Conditions: Demolition, cleaning and disposal requirements, cutting and patching requirements, and repairs.
- C. Section 26 0005 - Basic Electrical Requirements.
- D. Section 26 0519 - Low-Voltage Electrical Power Conductors and Cables: Manufactured wiring systems for use with access floor boxes with compatible pre-wired connectors.
- E. Section 26 0526 - Grounding and Bonding for Electrical Systems.
- F. Section 26 0533.16 - Boxes for Electrical Systems.
- G. Section 26 0533.23 - Surface Raceways for Electrical Systems: Surface raceway systems, including multioutlet assemblies.
- H. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.
- I. Section 26 0583 - Wiring Connections: Cords and plugs for equipment.
- J. Section 26 0953 - Distributed Digital Lighting Controls

1.03 REFERENCE STANDARDS

- A. FS W-C-596 - Connector, Electrical, Power, General Specification for 2017h.
- B. FS W-S-896 - Switches, Toggle (Toggle and Lock), Flush-mounted (General Specification) 2017g.
- C. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- D. NECA 130 - Standard for Installing and Maintaining Wiring Devices 2010.
- E. NEMA WD 1 - General Color Requirements for Wiring Devices 1999 (Reaffirmed 2015).
- F. NEMA WD 6 - Wiring Devices - Dimensional Specifications 2016.
- G. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- H. UL 20 - General-Use Snap Switches Current Edition, Including All Revisions.
- I. UL 498 - Attachment Plugs and Receptacles Current Edition, Including All Revisions.
- J. UL 514D - Cover Plates for Flush-Mounted Wiring Devices Current Edition, Including All Revisions.
- K. UL 943 - Ground-Fault Circuit-Interrupters Current Edition, Including All Revisions.
- L. UL 1310 - Class 2 Power Units Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:

1. Coordinate the placement of outlet boxes with millwork, furniture, equipment, etc. installed under other sections or by others.
 2. Coordinate wiring device ratings and configurations with the electrical requirements of actual equipment to be installed.
 3. Coordinate the placement of outlet boxes for wall switches with actual installed door swings.
 4. Coordinate the installation and preparation of uneven surfaces, such as split face block, to provide suitable surface for installation of wiring devices.
 5. Coordinate the core drilling of holes for poke-through assemblies with the work covered under other sections.
 6. Notify Architect of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.
- B. Sequencing:
1. Do not install wiring devices until final surface finishes and painting are complete.

1.05 SUBMITTALS

- A. Contractor shall provide submittals for equipment listed herein. Refer to Division 01 for submittal procedures.

PART 2 PRODUCTS

2.01 WIRING DEVICE APPLICATIONS

- A. Provide wiring devices suitable for intended use and with ratings adequate for load served.
- B. For single receptacles installed on an individual branch circuit, provide receptacle with ampere rating not less than that of the branch circuit.
- C. Provide weather resistant GFCI receptacles with specified weatherproof covers for receptacles installed outdoors or in damp or wet locations.
- D. Provide tamper resistant receptacles for receptacles installed in areas listed below:
1. All 15 and 20-ampere 125 and 250-volt nonlocking type receptacles in the areas listed below shall be listed tamper-resistant receptacles, unless otherwise excluded in NEC.
 - a. Dwelling units in all areas specified in NEC 210.52 and 550.13.
 - b. Business offices, corridors, waiting rooms and the like in clinics, medical and dental offices and outpatient facilities.
 - c. All early childhood/daycare areas and K-12 Educational Classrooms.
- E. Provide GFCI protection for receptacles installed within 6 feet of sinks.
- F. Provide GFCI protection for receptacles installed in kitchens.
- G. Provide GFCI protection for receptacles serving electric drinking fountains.
1. Outlet shall be readily accessible.
- H. Provide GFCI protection for outlets serving vending machines. Outlets shall be readily accessible.

2.02 WIRING DEVICE FINISHES

- A. Provide wiring device finishes as described below unless otherwise indicated.
- B. Wiring Devices, Unless Otherwise Indicated: White with gray stainless steel wall plate.
- C. Wiring Devices Connected to Emergency Power: Red with stainless steel wall plate factory engraved "Emergency".

2.03 WALL SWITCHES

- A. Wall Switches - General Requirements: AC only, quiet operating, general-use snap switches with silver alloy contacts, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 20 and where applicable, FS W-S-896; types as indicated on the drawings.

1. Wiring Provisions: Terminal screws for side wiring and screw actuated binding clamp for back wiring with separate ground terminal screw.

2.04 RECEPTACLES

- A. Manufacturers:
 1. Hubbell Incorporated: www.hubbell.com
 2. Leviton Manufacturing Company, Inc: www.leviton.com
 3. Lutron Electronics Company, Inc; Designer Style: www.lutron.com
 4. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us
- B. Receptacles - General Requirements: Self-grounding, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 498, and where applicable, FS W-C-596; types as indicated on the drawings.
 1. Wiring Provisions: Terminal screws for side wiring or screw actuated binding clamp for back wiring with separate ground terminal screw.
 2. NEMA configurations specified are according to NEMA WD 6.
- C. Convenience Receptacles:
 1. Standard Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R; single or duplex as indicated on the drawings.
 2. Tamper Resistant Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R, listed and labeled as tamper resistant type; single or duplex as indicated on the drawings.
 3. Tamper Resistant and Weather Resistant Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R, listed and labeled as tamper resistant type and as weather resistant type complying with UL 498 Supplement SE suitable for installation in damp or wet locations; single or duplex as indicated on the drawings.
- D. GFCI Receptacles:
 1. GFCI Receptacles - General Requirements: Self-testing, with feed-through protection and light to indicate ground fault tripped condition and loss of protection; listed as complying with UL 943, class A.
 - a. Provide test and reset buttons of same color as device.
 2. Standard GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style.
 3. Weather Resistant GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as weather resistant type complying with UL 498 Supplement SE suitable for installation in damp or wet locations.
 4. Tamper Resistant GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as tamper resistant type.
- E. USB Charging Devices:
 1. USB Charging Devices - General Requirements: Listed as complying with UL 1310.
 - a. Charging Capacity - Two-Port Devices: 2.1 A, minimum.
 2. USB Charging/Tamper Resistant Receptacle Combination Devices: Two-port (Type A) USB charging device and receptacle, commercial specification grade, duplex, 20A, 125V, NEMA 5-20R, listed and labeled as tamper resistant type; rectangular decorator style.

2.05 WALL PLATES

- A. Manufacturers:
 1. Hubbell Incorporated: www.hubbell-wiring.com
 2. Leviton Manufacturing Company, Inc: www.leviton.com
 3. Lutron Electronics Company, Inc: www.lutron.com
 4. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us

5. Source Limitations: Where wall controls are furnished as part of lighting control system, provide accessory matching receptacles and wallplates by the same manufacturer in locations indicated.
- B. Wall Plates: Comply with UL 514D.
 1. Configuration: One piece cover as required for quantity and types of corresponding wiring devices.
 2. Size: Standard.
 3. Screws: Metal with slotted heads finished to match wall plate finish.
- C. Stainless Steel Wall Plates: Brushed satin finish, Type 302 stainless steel.
- D. Weatherproof Covers for Damp Locations: Gasketed, cast aluminum, with self-closing hinged cover and corrosion-resistant screws; listed as suitable for use in wet locations with cover closed.
- E. Weatherproof Covers for Wet Locations: Gasketed, cast aluminum, with hinged lockable cover and corrosion-resistant screws; listed as suitable for use in wet locations while in use with attachment plugs connected and identified as extra-duty type.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate devices and conductors in accordance with NFPA 70.
- C. Verify that wall openings are neatly cut and will be completely covered by wall plates.
- D. Verify that final surface finishes are complete, including painting.
- E. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.
- F. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

- A. Provide extension rings to bring outlet boxes flush with finished surface.
- B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.03 INSTALLATION

- A. Perform work in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.
- B. Coordinate locations of outlet boxes provided under Section 26 0533.16 as required for installation of wiring devices provided under this section.
 1. Mounting Heights: Unless otherwise indicated, as follows:
 - a. Wall Switches: 48 inches above finished floor.
 - b. Receptacles: 18 inches above finished floor or 6 inches above counter.
 2. Where multiple receptacles, wall switches, or wall dimmers are installed at the same location and at the same mounting height, gang devices together under a common wall plate.
 3. Locate wall switches on strike side of door with edge of wall plate 3 inches from edge of door frame. Where locations are indicated otherwise, notify Architect to obtain direction prior to proceeding with work.
- C. Install wiring devices in accordance with manufacturer's instructions.
- D. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.

- E. Where required, connect wiring devices using pigtails not less than 6 inches long. Do not connect more than one conductor to wiring device terminals.
- F. Connect wiring devices by wrapping conductor clockwise 3/4 turn around screw terminal and tightening to proper torque specified by the manufacturer. Where present, do not use push-in pressure terminals that do not rely on screw-actuated binding.
- G. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
- H. Provide GFCI receptacles with integral GFCI protection at each location indicated. Do not use feed-through wiring to protect downstream devices.
- I. Install wiring devices plumb and level with mounting yoke held rigidly in place.
- J. Install wall switches with OFF position down.
- K. Install vertically mounted receptacles with grounding pole on top and horizontally mounted receptacles with grounding pole on left.
- L. Install wall plates to fit completely flush to wall with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.
- M. Install blank wall plates on junction boxes and on outlet boxes with no wiring devices installed or designated for future use.
- N. Identify wiring devices in accordance with Section 26 0553.

3.04 FIELD QUALITY CONTROL

- A. Inspect each wiring device for damage and defects.
- B. Operate each wall switch, wall dimmer, and fan speed controller with circuit energized to verify proper operation.
- C. Test each receptacle to verify operation and proper polarity.
- D. Test each GFCI receptacle for proper tripping operation according to manufacturer's instructions.
- E. Correct wiring deficiencies and replace damaged or defective wiring devices.

**SECTION 262813
FUSES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fuses.

1.02 RELATED REQUIREMENTS

- A. Division 01 - General Requirements: Project administrative and procedural requirements.
- B. Section 26 0005 - Basic Electrical Requirements.
- C. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.
- D. Section 26 0573 - Power System Studies: Additional criteria for the selection of protective devices specified in this section.
- E. Section 26 2416 - Panelboards: Fusible switches.
- F. Section 26 2816.16 - Enclosed Switches: Fusible switches.

1.03 REFERENCE STANDARDS

- A. NEMA FU 1 - Low Voltage Cartridge Fuses 2012.
- B. UL 248-1 - Low-Voltage Fuses - Part 1: General Requirements Current Edition, Including All Revisions.
- C. UL 248-10 - Low-Voltage Fuses - Part 10: Class L Fuses Current Edition, Including All Revisions.
- D. UL 248-12 - Low-Voltage Fuses - Part 12: Class R Fuses Current Edition, Including All Revisions.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Bussmann, a division of Eaton Corporation: www.cooperindustries.com
- B. Littelfuse, Inc: www.littelfuse.com
- C. Mersen: ep-us.mersen.com

2.02 APPLICATIONS

- A. Service Entrance:
 - 1. Fusible Switches up to 600 Amperes: Class RK1, time-delay.
 - 2. Fusible Switches Larger Than 600 Amperes: Class L, time-delay.
- B. Feeders:
 - 1. Fusible Switches up to 600 Amperes: Class RK1, time-delay.
 - 2. Fusible Switches Larger Than 600 Amperes: Class L, time-delay.

2.03 FUSES

- A. Provide products listed, classified, and labeled as suitable for the purpose intended.
- B. Unless specifically indicated to be excluded, provide fuses for all fusible equipment as required for a complete operating system.
- C. Provide fuses of the same type, rating, and manufacturer within the same switch.
- D. Comply with UL 248-1.
- E. Unless otherwise indicated, provide cartridge type fuses complying with NEMA FU 1, Class and ratings as indicated.

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- F. Voltage Rating: Suitable for circuit voltage.
- G. Class R Fuses: Comply with UL 248-12.
- H. Class L Fuses: Comply with UL 248-10.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that fuse ratings are consistent with circuit voltage and manufacturer's recommendations and nameplate data for equipment.
- B. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Do not install fuses until circuits are ready to be energized.
- B. Install fuses with label oriented such that manufacturer, type, and size are easily read.

**SECTION 262816.16
ENCLOSED SWITCHES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Enclosed safety switches.

1.02 RELATED REQUIREMENTS

- A. Division 01 - General Requirements: Project administrative and procedural requirements.
- B. Section 26 0005 - Basic Electrical Requirements.
- C. Section 26 0526 - Grounding and Bonding for Electrical Systems.
- D. Section 26 0529 - Hangers and Supports for Electrical Systems.
- E. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.
- F. Section 26 0573 - Power System Studies: Additional criteria for the selection of equipment and associated protective devices specified in this section.
- G. Section 26 2813 - Fuses.
- H. Section 26 3600 - Transfer Switches: Automatic and non-automatic switches listed for use as transfer switch equipment.

1.03 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- B. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2020.
- C. NEMA KS 1 - Heavy Duty Enclosed and Dead-Front Switches (600 Volts Maximum) 2013.
- D. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems 2017.
- E. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- F. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations Current Edition, Including All Revisions.
- G. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations Current Edition, Including All Revisions.
- H. UL 98 - Enclosed and Dead-Front Switches Current Edition, Including All Revisions.
- I. UL 869A - Reference Standard for Service Equipment Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the work with other trades. Avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and within working clearances for electrical equipment required by NFPA 70.
 - 2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
 - 3. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.
 - 4. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. ABB/GE: www.geindustrial.com
- B. Eaton Corporation: www.eaton.com
- C. Schneider Electric; Square D Products: www.schneider-electric.us
- D. Siemens Industry, Inc: www.usa.siemens.com

2.02 ENCLOSED SAFETY SWITCHES

- A. Description: Quick-make, quick-break enclosed safety switches listed and labeled as complying with UL 98; heavy duty; ratings, configurations, and features as indicated on the drawings.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:
 - 1. Altitude: Less than 6,600 feet.
 - 2. Ambient Temperature: Between -22 degrees F and 104 degrees F.
- D. Horsepower Rating: Suitable for connected load.
- E. Voltage Rating: Suitable for circuit voltage.
- F. Short Circuit Current Rating:
 - 1. Provide enclosed safety switches, when protected by the fuses or supply side overcurrent protective devices to be installed, with listed short circuit current rating not less than the available fault current at the installed location as indicated on the drawings.
- G. Enclosed Safety Switches Used for Service Entrance: Listed and labeled as suitable for use as service equipment according to UL 869A.
- H. Provide with switch blade contact position that is visible when the cover is open.
- I. Conductor Terminations: Suitable for use with the conductors to be installed.
- J. Provide solidly bonded equipment ground bus in each enclosed safety switch, with a suitable lug for terminating each equipment grounding conductor.
- K. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.
 - 1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
 - a. Indoor Clean, Dry Locations: Type 1.
 - b. Outdoor Locations: Type 3R.
- L. Provide safety interlock to prevent opening the cover with the switch in the ON position with capability of overriding interlock for testing purposes.
- M. Heavy Duty Switches:
 - 1. Comply with NEMA KS 1.
 - 2. Conductor Terminations:
 - a. Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
 - 3. Provide externally operable handle with means for locking in the OFF position, capable of accepting three padlocks.
 - a. Provide means for locking handle in the ON position where indicated.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).

- C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- D. Provide required support and attachment in accordance with Section 26 0529.
- E. Install enclosed switches plumb.
- F. Except where indicated to be mounted adjacent to the equipment they supply, mount enclosed switches such that the highest position of the operating handle does not exceed 79 inches above the floor or working platform.
- G. Provide grounding and bonding in accordance with Section 26 0526.
- H. Identify enclosed switches in accordance with Section 26 0553.

3.02 ADJUSTING

- A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.

**SECTION 265100
INTERIOR LIGHTING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Interior luminaires.
- B. Emergency lighting units.
- C. Ballasts and drivers.
- D. Fluorescent emergency power supply units.
- E. LED emergency power supply units.
- F. Emergency Lighting Control Units (Transfer Switches)
- G. Accessories.

1.02 RELATED REQUIREMENTS

- A. Division 01 - General Requirements: Project administrative and procedural requirements.
- B. Division 02 - Existing Conditions: Demolition, cleaning and disposal requirements, cutting and patching requirements, repairs.
- C. Section 26 0005 - Basic Electrical Requirements.
- D. Section 26 0533.13 - Conduit for Electrical Systems.
- E. Section 26 0529 - Hangers and Supports for Electrical Systems.
- F. Section 26 0533.16 - Boxes for Electrical Systems.
- G. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.
- H. Section 26 0935 - Distributed Digital Lighting Control System: Devices for automatic control of lighting, including occupancy sensors, daylighting controls, networked control stations and motion sensors.
- I. Section 26 2726 - Wiring Devices: Manual wall switches and wall dimmers.
- J. Section 26 5600 - Exterior Lighting.

1.03 REFERENCE STANDARDS

- A. IEC 60529 - Degrees of Protection Provided by Enclosures (IP Code) 2013 (Corrigendum 2019).
- B. IEEE C62.41.2 - IEEE Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and less) AC Power Circuits 2002 (Corrigendum 2012).
- C. IES LM-63 - IESNA Standard File Format for Electronic Transfer of Photometric Data and Related Information 2002 (Reaffirmed 2008).
- D. IES LM-79 - Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products 2008.
- E. IES LM-80 - Approved Method: Measuring Luminous Flux and Color Maintenance of LED Packages, Arrays, and Modules 2015, with Errata (2017).
- F. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- G. NECA/IESNA 500 - Standard for Installing Indoor Commercial Lighting Systems 2006.
- H. NECA/IESNA 502 - Standard for Installing Industrial Lighting Systems 2006.
- I. NEMA 410 - Performance Testing for Lighting Controls and Switching Devices with Electronic Drivers and Discharge Ballasts 2016.

- J. NEMA LE 4 - Recessed Luminaires, Ceiling Compatibility 2012.
- K. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- L. NFPA 101 - Life Safety Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- M. UL 924 - Emergency Lighting and Power Equipment Current Edition, Including All Revisions.
- N. UL 1598 - Luminaires Current Edition, Including All Revisions.
- O. UL 1598C - Light-Emitting Diode (LED) Retrofit Luminaire Conversion Kits Current Edition, Including All Revisions.
- P. UL 8750 - Light Emitting Diode (LED) Equipment for Use in Lighting Products Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the installation of luminaires with mounting surfaces installed under other sections or by others. Coordinate the work with placement of supports, anchors, etc. required for mounting. Coordinate compatibility of luminaires and associated trims with mounting surfaces at installed locations.
 - 2. Coordinate the placement of luminaires with structural members, ductwork, piping, equipment, diffusers, fire suppression system components, and other potential conflicts installed under other sections or by others.
 - 3. Coordinate the placement of exit signs with furniture, equipment, signage or other potential obstructions to visibility installed under other sections or by others.
 - 4. Notify Architect of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.

1.05 SUBMITTALS

- A. Contractor shall provide submittals for equipment listed herein. Refer to Division 01 for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, installed accessories, and ceiling compatibility; include model number nomenclature clearly marked with all proposed features.
 - 1. LED Luminaires:
 - a. Include estimated useful life, calculated based on IES LM-80 test data.
- C. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70 and NFPA 101.

PART 2 PRODUCTS

2.01 LUMINAIRE TYPES

- A. Furnish products as indicated in luminaire schedule included on the drawings.

2.02 LUMINAIRES

- A. Provide products that comply with requirements of NFPA 70 and NFPA 101.
- B. Provide products that are listed and labeled as complying with UL 1598, where applicable.

- C. Provide products listed, classified, and labeled as suitable for the purpose intended.
- D. Unless otherwise indicated, provide complete luminaires including lamp(s), light engines, drivers and all sockets, ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.
- E. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, supports, trims, accessories, etc. as necessary for a complete operating system.
- F. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.
- G. Recessed Luminaires:
 - 1. Ceiling Compatibility: Comply with NEMA LE 4.
 - 2. Luminaires Recessed in Insulated Ceilings: Listed and labeled as IC-rated, suitable for direct contact with insulation and combustible materials.
 - 3. Luminaires Recessed in Sloped Ceilings: Provide suitable sloped ceiling adapters.
 - 4. Air-Handling Recessed Fluorescent Luminaires: Suitable for air supply/return, heat removal, or combination as indicated.
- H. LED Luminaires:
 - 1. Components: UL 8750 recognized or listed as applicable.
 - 2. Tested in accordance with IES LM-79 and IES LM-80.
 - 3. LED Estimated Useful Life: Minimum of 50,000 hours at 70 percent lumen maintenance, calculated based on IES LM-80 test data.

2.03 EMERGENCY LIGHTING UNITS

- A. Description: Emergency lighting units complying with NFPA 101 and all applicable state and local codes, and listed and labeled as complying with UL 924.
- B. Operation: Upon interruption of normal power source or brownout condition exceeding 20 percent voltage drop from nominal, solid-state control automatically switches connected lamps to integral battery power for minimum of 90 minutes of rated emergency illumination, and automatically recharges battery upon restoration of normal power source.
- C. Battery:
 - 1. Sealed maintenance-free lead calcium unless otherwise indicated.
 - 2. Size battery to supply all connected lamps, including emergency remote heads where indicated.
- D. Diagnostics: Provide power status indicator light and accessible integral test switch to manually activate emergency operation.
- E. Provide low-voltage disconnect to prevent battery damage from deep discharge.

2.04 BALLASTS AND DRIVERS

- A. Ballasts/Drivers - General Requirements:
 - 1. Provide ballasts containing no polychlorinated biphenyls (PCBs).
 - 2. Minimum Efficiency/Efficacy: Provide ballasts complying with all current applicable federal and state ballast efficiency/efficacy standards.
 - 3. Electronic Ballasts/Drivers: Inrush currents not exceeding peak currents specified in NEMA 410.
- B. Dimmable LED Drivers:
 - 1. Dimming Range: Continuous dimming from 100 percent to 10 percent relative light output unless dimming capability to lower level is indicated, without flicker.
 - 2. Control Compatibility: Fully compatible with the dimming controls to be installed.

- C. Dimmable LED Drivers: Comply with Section 26 0935 - Distributed Digital Lighting Control System.

2.05 LED EMERGENCY POWER SUPPLY UNITS

- A. Manufacturers:
1. Iota Engineering, LLC: www.iotaengineering.com/#sle.
 2. Lithonia Lighting: www.lithonia.com/#sle.
 3. Philips Emergency Lighting/Bodine: www.bodine.com/#sle.
 4. Manufacturer Limitations: Where possible, for each type of luminaire provide fluorescent emergency power supply units produced by a single manufacturer.
 5. Where a specific manufacturer or model is indicated elsewhere in the luminaire schedule or on the drawings, substitutions are not permitted unless explicitly indicated.
- B. Description: Self-contained fluorescent emergency power supply units suitable for use with indicated luminaires, complying with NFPA 101 and all applicable state and local codes, and listed and labeled as complying with UL 924.
- C. Operation: Upon interruption of normal power source, solid-state control automatically switches connected lamp(s) to the fluorescent emergency power supply for minimum of 90 minutes of rated emergency illumination, and automatically recharges battery upon restoration of normal power source.
- D. Battery: Sealed maintenance-free high-temperature nickel cadmium unless otherwise indicated.
- E. Diagnostics: Provide accessible and visible multi-chromatic combination test switch/indicator light to display charge, test, and diagnostic status and to manually activate emergency operation.
- F. Self-Diagnostics: Provide units that self-monitor functionality and automatically perform testing required by NFPA 101 where indicated; provide indicator light(s) to report test and diagnostic status and field selectable audible alert.

2.06 EMERGENCY LIGHTING CONTROL DEVICES (TRANSFER DEVICES)

- A. Manufacturers:
1. Philips Emergency Lighting Bodine: www.philips.com/bodine
 2. Iota Engineering: www.iotaengineering.com
 3. Engineer pre-approved equal
- B. General Requirements:
1. The emergency lighting control device shall work in conjunction with an auxiliary generator or a central inverter system to power light fixtures for egress lighting regardless of fixture wall switch position.
 2. All units shall be UL924 listed and approved.
- C. Operation:
1. Device shall sense loss of normal power and switch the AC driver input power connected to an unswitched generator (or central inverter) supplied lighting circuit.
 2. The device shall be capable of bypassing the wall switch when the auxiliary generator (or central inverter) powers.
 3. Unit shall be capable of 120/277 volt operation.
- D. Equipment:
1. Emergency Lighting Control Device - 3 Amp
 - a. For use within a single luminaire. Device shall be suitable for indoor and damp locations and capable of being used with fluorescent or LED lighting loads. Device shall be UL listed for installation inside, on top of or remote from the fixture. Shall include power loss sensing, UL924 listed and approved.

2. Emergency Lighting Control Device - 20 Amp
 - a. For use adjacent to local switching means. Device shall be suitable for indoor and damp locations and capable of being used with incandescent, fluorescent and LED lighting loads. Shall include power loss sensing, UL 924 listed and approved.
3. Branch Circuit Emergency Lighting Transfer Switch
 - a. Mounted onto junction box type, verify with field conditions. Device shall be suitable for indoor, damp and plenum (UL 2043) locations and capable of being used with incandescent, fluorescent and LED lighting loads. Shall include power loss sensing, UL 924 listed and approved.

2.07 MICRO AND MINI INVERTERS

- A. Manufacturers:
 1. Philips Emergency Lighting Bodine: www.philips.com/bodine
 2. Iota Engineering: www.iotaengineering.com
 3. Engineer pre-approved equal.
- B. Description: Emergency lighting units complying with NFPA 101 and all applicable state and local codes, and listed and labeled as complying with UL 924.
- C. Operation: Upon interruption of normal power source, solid-state control automatically switches connected lamp(s) to the emergency power supply for minimum of 90 minutes of rated emergency illumination, and automatically recharges battery upon restoration of normal power source.
- D. Battery:
 1. Hightemperature rechargeable, replaceable nickel-cadmium.
 2. Battery shall be sized to supply all connected lamps where indicated.
- E. Diagnostics: Unit shall include test switch and charge indicator light.
- F. Unit shall be sine wave output capable with dual voltage input and output capabilities.
- G. Provide with low-voltage battery disconnect.
- H. Installation locations shall be coordinated with selected manufacturer's requirements and said manufacturer's distance limitations.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate conductors in accordance with NFPA 70.
- B. Verify that suitable support frames are installed where required.
- C. Verify that branch circuit wiring installation is completed, tested, and ready for connection to luminaires.
- D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Coordinate locations of outlet boxes provided under Section 26 0533.16 as required for installation of luminaires provided under this section.
- B. Install products in accordance with manufacturer's instructions.
- C. Install luminaires securely, in a neat and workmanlike manner, as specified in NECA 500 (commercial lighting) and NECA 502 (industrial lighting).
- D. Provide required support and attachment in accordance with Section 26 0529.
- E. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.

- F. Suspended Ceiling Mounted Luminaires:
 - 1. Do not use ceiling tiles to bear weight of luminaires.
 - 2. Do not use ceiling support system to bear weight of luminaires unless ceiling support system is certified as suitable to do so.
 - 3. Secure surface-mounted and recessed luminaires to ceiling support channels or framing members or to building structure.
 - 4. Secure lay-in luminaires to ceiling support channels using listed safety clips at four corners.
 - 5. See appropriate Division 09 section where suspended grid ceiling is specified for additional requirements.
- G. Recessed Luminaires:
 - 1. Install trims tight to mounting surface with no visible light leakage.
 - 2. Non-IC Rated Luminaires: Maintain required separation from insulation and combustible materials according to listing.
 - 3. Luminaires Recessed in Fire-Rated Ceilings: Install using accessories and firestopping materials to meet regulatory requirements for fire rating.
- H. Suspended Luminaires:
 - 1. Install using the suspension method indicated, with support lengths and accessories as required for specified mounting height.
 - 2. Install canopies tight to mounting surface.
- I. Wall-Mounted Luminaires: Unless otherwise indicated, specified mounting heights are to bottom of luminaire.
- J. Install accessories furnished with each luminaire.
- K. Bond products and metal accessories to branch circuit equipment grounding conductor.
- L. Emergency Lighting Units:
 - 1. Unless otherwise indicated, connect unit to unswitched power from same circuit feeding normal lighting in same room or area. Bypass local switches, contactors, or other lighting controls.
- M. Exit Signs:
 - 1. Unless otherwise indicated, connect unit to unswitched power from same circuit feeding normal lighting in same room or area. Bypass local switches, contactors, or other lighting controls.
- N. LED Emergency Power Supply Units:
 - 1. For field-installed units, install inside luminaire unless otherwise indicated. Where installation inside luminaire is not possible, install on top of luminaire.
- O. Identify luminaires connected to emergency power system in accordance with Section 26 0553.
- P. Install lamps in each luminaire.

3.03 FIELD QUALITY CONTROL

- A. Inspect each product for damage and defects.
- B. Operate each luminaire after installation and connection to verify proper operation.
- C. Test self-powered exit signs, emergency lighting units, and fluorescent emergency power supply units to verify proper operation upon loss of normal power supply.

**SECTION 284600
FIRE DETECTION AND ALARM**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fire alarm system design and installation, including all components, wiring, and conduit.
- B. Transmitters for communication with supervising station.
- C. Circuits from protected premises to supervising station, including conduit.
- D. Replacement and removal of existing fire alarm system components, wiring, and conduit indicated.
- E. Maintenance of fire alarm system under contract for specified warranty period.

1.02 RELATED REQUIREMENTS

- A. Division 01 - General Requirements: Project administrative and procedural requirements.
- B. Division 02 - Existing Conditions: Demolition, cleaning and disposal requirements, cutting and patching requirements, and repairs.
- C. Division 07 - Thermal and Moisture Protection: Materials and methods for work to be performed by this installer.
- D. Division 08 - Openings: Door hardware, coiling fire doors and smoke and/or fire curtains to be released by fire alarm system.
- E. Division 14 - Conveying Equipment: Elevator systems monitored and controlled by fire alarm system and sensors and interlocks by fire alarm system.
- F. Section 21 1300 - Fire-Suppression Sprinkler Systems: Supervisory, alarm, and actuating devices installed in sprinkler system.
- G. Section 21 3000 - Fire Pumps: Supervisory devices.
- H. Section 23 3300 - Air Duct Accessories: Smoke dampers monitored and controlled by fire alarm system.
- I. Section 26 0005 - Basic Electrical Requirements.
- J. Section 26 0505 - Selective Demolition for Electrical
- K. Section 26 0533.13 - Conduit for Electrical Systems.
- L. Section 26 0533.16 - Boxes for Electrical Systems.
- M. Section 26 0553 - Identification for Electrical Systems.

1.03 REFERENCE STANDARDS

- A. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines current edition.
- B. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design 2010.
- C. IEEE C62.41.2 - IEEE Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and less) AC Power Circuits 2002 (Corrigendum 2012).
- D. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- E. NFPA 72 - National Fire Alarm and Signaling Code Most Recent Edition Cited by Referring Code or Reference Standard.
- F. NFPA 101 - Life Safety Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

- G. UL 268 - Standard for Smoke Detectors for Fire Alarm Systems Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. Contractor shall provide submittals for equipment listed herein. Refer to Division 01 for submittal procedures.
- B. Evidence of designer qualifications.
- C. Design Documents: Submit all information required for plan review and permitting by authorities having jurisdiction, including but not limited to floor plans, riser diagrams, and description of operation:
 - 1. Copy (if any) of list of data required by authority having jurisdiction.
 - 2. NFPA 72 "Record of Completion", filled out to the extent known at the time.
 - 3. Clear and concise description of operation, with input/output matrix similar to that shown in NFPA 72 Appendix A-7-5-2.2(9), and complete listing of software required.
 - 4. System zone boundaries and interfaces to fire safety systems.
 - 5. Location of all components, circuits, and raceways; mark components with identifiers used in control unit programming.
 - 6. Circuit layouts; number, size, and type of raceways and conductors; conduit fill calculations; spare capacity calculations; notification appliance circuit voltage drop calculations.
 - 7. List of all devices on each signaling line circuit, with spare capacity indicated.
 - 8. Manufacturer's detailed data sheet for each component, including wiring diagrams, installation instructions, and circuit length limitations.
 - 9. Description of power supplies; if secondary power is by battery include calculations demonstrating adequate battery power.
 - 10. Certification by either the manufacturer of the control unit or by the manufacturer of each other component that the components are compatible with the control unit.
 - 11. Certification by the manufacturer of the control unit that the system design complies with Contract Documents.
 - 12. Certification by Contractor that the system design complies with Contract Documents.
- D. Evidence of installer qualifications.
- E. Evidence of instructor qualifications; training lesson plan outline.
- F. Evidence of maintenance contractor qualifications, if different from installer.
- G. Inspection and Test Reports:
 - 1. Submit inspection and test plan prior to closeout demonstration.
 - 2. Submit documentation of satisfactory inspections and tests.
 - 3. Submit NFPA 72 "Inspection and Test Form," filled out.
- H. Operating and Maintenance Data: Revise and resubmit until acceptable; have one set available during closeout demonstration:
 - 1. Complete set of specified design documents, as approved by authority having jurisdiction.
 - 2. Additional printed set of project record documents and closeout documents, bound or filed in same manuals.
 - 3. Contact information for firm that will be providing contract maintenance and trouble call-back service.
 - 4. List of recommended spare parts, tools, and instruments for testing.
 - 5. Replacement parts list with current prices, and source of supply.
 - 6. Detailed troubleshooting guide and large scale input/output matrix.
 - 7. Preventive maintenance, inspection, and testing schedule complying with NFPA 72; provide printed copy and computer format acceptable to Owner.

8. Detailed but easy to read explanation of procedures to be taken by non-technical administrative personnel in the event of system trouble, when routine testing is being conducted, for fire drills, and when entering into contracts for remodeling.
- I. Project Record Documents: Have one set available during closeout demonstration:
 1. Complete set of floor plans showing actual installed locations of components, conduit, and zones.
 2. "As installed" wiring and schematic diagrams, with final terminal identifications.
 3. "As programmed" operating sequences, including control events by device, updated input/output chart, and voice messages by event.
- J. Closeout Documents:
 1. Certification by manufacturer that the system has been installed in compliance with manufacturer's installation requirements, is complete, and is in satisfactory operating condition.
 2. NFPA 72 "Record of Completion", filled out completely and signed by installer and authorized representative of authority having jurisdiction.

1.05 QUALITY ASSURANCE

- A. Designer Qualifications: NICET Level III or IV (3 or 4) certified fire alarm technician or registered fire protection engineer, employed by fire alarm control panel manufacturer, Contractor, or installer, with experience designing fire alarm systems in the jurisdictional area of the authorities having jurisdiction.
- B. Installer Qualifications: Firm with minimum 3 years documented experience installing fire alarm systems of the specified type and providing contract maintenance service as a regular part of their business.
 1. Authorized representative of control unit manufacturer; submit manufacturer's certification that installer is authorized; include name and title of manufacturer's representative making certification.
 2. Installer Personnel: At least 2 years of experience installing fire alarm systems.
 3. Supervisor: NICET level III or IV (3 or 4) certified fire alarm technician; furnish name and address.
- C. Maintenance Contractor Qualifications: Same entity as installer or different entity with specified qualifications.
- D. Instructor Qualifications: Experienced in technical instruction, understanding fire alarm theory, and able to provide the required training; trained by fire alarm control unit manufacturer.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Fire Alarm Control Units and Accessories:
 1. Honeywell Security & Fire Solutions/Notifier: www.notifier.com.
 2. National Time & Signal: www.natsco.net.
 3. Siemens Building Technologies, Inc: www.usa.siemens.com.
 4. Simplex, a brand of Johnson Controls: www.simplex-fire.com.
 5. Provide control units made by the same manufacturer.
- B. Initiating Devices and Notification Appliances:
 1. Same manufacturer as control units.
 2. Provide initiating devices and notification appliances made by the same manufacturer, where possible.

2.02 FIRE ALARM SYSTEM

- A. Fire Alarm System: Provide a new automatic fire detection and alarm system:

1. Provide all components necessary, regardless of whether shown in Contract Documents or not.
 2. Protected Premises: Entire building shown on drawings.
 3. Comply with the following; where requirements conflict, order of precedence of requirements is as listed:
 - a. ADA Standards.
 - b. The requirements of the local authority having jurisdiction .
 - c. Applicable local codes.
 - d. Contract Documents (drawings and specifications).
 - e. NFPA 72; where the word "should" is used consider that provision mandatory; where conflicts between requirements require deviation from NFPA 72, identify deviations clearly on design documents.
 4. Evacuation Alarm: Multiple smoke zones; allow for evacuation notification of any individual zone or combination of zones, in addition to general evacuation of entire premises.
 5. Voice Notification: Provide emergency voice/alarm communications with multichannel capability; digital.
 6. General Evacuation Zones: Each smoke zone is considered a general evacuation zone unless otherwise indicated, with alarm notification in all zones on the same floor, on the floor above, and the floor below.
 7. Program notification zones and voice messages as directed by Owner.
 8. Fire Command Center: Location indicated on drawings.
 9. Fire Alarm Control Unit: New, located at fire command center.
- B. Supervising Stations and Fire Department Connections:
1. Public Fire Department Notification: By on-premises supervising station.
 2. On-Premises Supervising Station: Existing proprietary station operated by Owner, located at _____.
 3. Means of Transmission to On-Premises Supervising Station: Directly connected noncoded system.
- C. Circuits:
1. Initiating Device Circuits (IDC): Class B, Style A.
 2. Signaling Line Circuits (SLC) Within Single Building: Class B, Style 0.5.
 3. Notification Appliance Circuits (NAC): Class B, Style W.
- D. Spare Capacity:
1. Fire Alarm Control Units: Capable of handling all circuits utilized to capacity without requiring additional components other than plug-in control modules.
- E. Power Sources:
1. Primary: Dedicated branch circuits of the facility power distribution system.
 2. Secondary: Storage batteries.
 3. Capacity: Sufficient to operate entire system for period specified by NFPA 72.
 4. Each Computer System: Provide uninterruptible power supply (UPS).

2.03 FIRE SAFETY SYSTEMS INTERFACES

- A. Supervision: Provide supervisory signals in accordance with NFPA 72 for the following:
1. Sprinkler water control valves.
 2. Dry-pipe sprinkler system pressure.
 3. Dry-pipe sprinkler valve room low temperature.
 4. Fire pump(s).
 5. Elevator shut-down control circuits.
 6. Chute interlocks and controls.

- B. Alarm: Provide alarm initiation in accordance with NFPA 72 for the following:
 - 1. Sprinkler water flow.
 - 2. Elevator lobby, elevator hoistway, and elevator machine room smoke detectors.
- C. Elevators:
 - 1. Elevator lobby, hoistway, and machine room smoke detectors: Elevator recall for fire fighters' service.
 - 2. Elevator Machine Room Heat Detector: Shut down elevator power prior to hoistway sprinkler activation.
 - 3. Sprinkler pressure or waterflow: Shut down elevator power prior to hoistway sprinkler activation.
- D. HVAC:
 - 1. Duct Smoke Detectors: Close dampers indicated; shut down air handlers indicated.
- E. Doors:
 - 1. Smoke Barrier Door Magnetic Holders: Release upon activation of smoke detectors in smoke zone on either side of door, upon alarm from manual pull station on same floor, and upon sprinkler activation on same floor. Refer to Section 08 7100.
 - 2. Electromagnetic Door Locks on Egress Doors: Unlock upon activation of any alarm initiating device or suppression system in smoke zone that doors serve as egress from. Refer to Division 08.

2.04 COMPONENTS

- A. General:
 - 1. Provide flush mounted units where installed in finish areas; in unfinished areas, surface mounted unit are acceptable.
 - 2. Provide legible, permanent labels for each control device, using identification used in operation and maintenance data.
- B. Fire Alarm Control Units: Analog, addressable type; listed, classified, and labeled as suitable for the purpose intended.
- C. Master Control Unit: As specified for Basis of Design above, or equivalent.
- D. Remote Annunciators: locate per plans.
- E. Initiating Devices:
 - 1. Addressable Systems:
 - a. Addressable Devices: Individually identifiable by addressable fire alarm control unit.
 - b. Provide suitable addressable interface modules as indicated or as required for connection to conventional (non-addressable) devices and other components that provide a dry closure output.
- F. Circuit Conductors: Copper or optical fiber; provide 200 feet extra; color code and label.
- G. Surge Protection: In accordance with IEEE C62.41.2 category B combination waveform and NFPA 70; except for optical fiber conductors.
- H. Locks and Keys: Deliver keys to Owner.
- I. Instruction Charts: Printed instruction chart for operators, showing steps to be taken when a signal is received (normal, alarm, supervisory, and trouble); easily readable from normal operator's station.
 - 1. Frame: Stainless steel or aluminum with polycarbonate or glass cover.
 - 2. Provide one for each control unit where operations are to be performed.
 - 3. Obtain approval of Owner prior to mounting; mount in location acceptable to Owner.
 - 4. Provide extra copy with operation and maintenance data submittal.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with applicable codes, NFPA 72, NFPA 70, and Contract Documents.
- B. Conceal all wiring, conduit, boxes, and supports where installed in finished areas.
- C. Obtain Owner's approval of locations of devices, before installation.
- D. Install instruction cards and labels.

3.02 INSPECTION AND TESTING FOR COMPLETION

- A. Notify Owner 7 days prior to beginning completion inspections and tests.
- B. Notify authorities having jurisdiction and comply with their requirements for scheduling inspections and tests and for observation by their personnel.
- C. Provide the services of the installer's supervisor or person with equivalent qualifications to supervise inspection and testing, correction, and adjustments.
- D. Prepare for testing by ensuring that all work is complete and correct; perform preliminary tests as required.
- E. Provide all tools, software, and supplies required to accomplish inspection and testing.
- F. Perform inspection and testing in accordance with NFPA 72 and requirements of local authorities; document each inspection and test.
- G. Correct defective work, adjust for proper operation, and retest until entire system complies with Contract Documents.

3.03 OWNER PERSONNEL INSTRUCTION

- A. Provide the following instruction to designated Owner personnel:
 - 1. Hands-On Instruction: On-site, using operational system.
 - 2. Classroom Instruction: Owner furnished classroom, on-site or at other local facility.
- B. Administrative: One-hour session(s) covering issues necessary for non-technical administrative staff; classroom:
 - 1. Initial Training: 1 session pre-closeout.
- C. Basic Operation: One-hour sessions for attendant personnel, security officers, and engineering staff; combination of classroom and hands-on:
 - 1. Initial Training: 1 session pre-closeout.
- D. Furnish the services of instructors and teaching aids; have copies of operation and maintenance data available during instruction.

3.04 CLOSEOUT

- A. Closeout Demonstration: Demonstrate proper operation of all functions to Owner.
 - 1. Be prepared to conduct any of the required tests.
 - 2. Have at least one copy of operation and maintenance data, preliminary copy of project record drawings, input/output matrix, and operator instruction chart(s) available during demonstration.
 - 3. Have authorized technical representative of control unit manufacturer present during demonstration.
 - 4. Demonstration may be combined with inspection and testing required by authority having jurisdiction; notify authority having jurisdiction in time to schedule demonstration.
 - 5. Repeat demonstration until successful.

3.05 MAINTENANCE

- A. See Division 01 for additional requirements relating to maintenance service.

- B. Perform routine inspection, testing, and preventive maintenance required by NFPA 72, including:
 - 1. Maintenance of fire safety interface and supervisory devices connected to fire alarm system.
 - 2. Repairs required, unless due to improper use, accidents, or negligence beyond the control of the maintenance contractor.
 - 3. Record keeping required by NFPA 72 and authorities having jurisdiction.
- C. Provide trouble call-back service upon notification by Owner:
 - 1. Provide on-site response within 2 hours of notification.
 - 2. Include allowance for call-back service during normal working hours at no extra cost to Owner.
 - 3. Owner will pay for call-back service outside of normal working hours on an hourly basis, based on actual time spent at site and not including travel time; include hourly rate and definition of normal working hours in maintenance contract.
- D. Provide a complete description of preventive maintenance, systematic examination, adjustment, cleaning, inspection, and testing, with a detailed schedule.
- E. Maintain a log at each fire alarm control unit, listing the date and time of each inspection and call-back visit, the condition of the system, nature of the trouble, correction performed, and parts replaced. Submit duplicate of each log entry to Owner's representative upon completion of site visit.
- F. Comply with Owner's requirements for access to facility and security.